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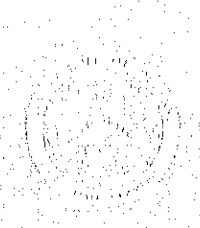

DEPARTMENT OF DEFENSE

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TANT SECRETARY OF
NSE-PUBLIC AFFAIRS

Departing Assistant Secretary Sylvester Cites Industry's Support of Bulletin

As I prepare to leave the Department of Defense, I want to take this opportunity to express my appreciation to all the members of industry—both management and labor—who have supported the *Defense Industry Bulletin*.

In the first issue of the *Bulletin*, which appeared two years ago this month, I stated that the publication was aimed at serving your needs and that we would look to you to help us guide its future course. Your response has indeed been gratifying with the result that our industry readership has expanded from 1,100 at the outset to over 9,000 copies with this issue.

I hope that in the years ahead your acceptance and support of the *Bulletin* will continue, and that through this partnership the value of the publication to the defense industry will be steadily enhanced.

Arthur Sylvester

Navy League To Sponsor Briefings and Exposition at Annual Meeting Feb. 8-10

"Oceans Unlimited" is the theme of the 1967 Sea-Air-Space Exposition and Briefings, sponsored by the Navy League of the United States, and the District of Columbia Council's 10th Annual Seapower Symposium to be held concurrently at the Sheraton Park Hotel, Washington, D.C., Feb. 8-10.

Industry and Government will exhibit the present and future in the technical research and development field related to the Navy/Marine Corps mission in sea, air and space. Representatives of the Naval Material Command will give presentations reflecting the Navy's latest thinking.

Industrial firms participating in the exposition have scheduled 42 technical briefings to be presented in the Exhibit Hall five times each morning and three times each afternoon. There will be no registration fee for military and Government personnel attending the industry briefings. Attendees at the morning briefings will be guests at a complementary luncheon to be held each day. Shuttle buses will operate daily between the Pentagon, Main Navy Building and the Sheraton Park Hotel. For additional information concerning the industry technical briefings contact: Commander Holmgaard, Office of the Chief of Information, Department of the Navy, Washington, D.C., (Area Code 202) OXford 5-5713.

For registration information contact: District of Columbia Council, 1629 K St. NW, Washington, D.C. 20006, (Area Code 202) 296-7029.

DEFENSE INDUS

BULLET

Published by the Departm of Defense

Hon. Robert S. McNamara Secretary of I

Hon. Cyrus R. Vance Deputy Secretary of I

Hon. Arthur Sylvester Assistant Secretary of I (Public Affairs)

Col. Joel B. Stephens, USA Director for Community R

Col. Edwin C. Gibson, USA Chief, Business & Labor I

Editor.......LCdr. E. W. Bradfor

Assoc. Editor.........Miss Cecilia

Assoc. Editor..........Mr. Rick L

Editorial Assistant Norman E. Worra, JO

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The purpose of the *Bull* to serve as a means of commun between the Department of I (DOD) and its authorized a and defense contractors and business interests. It will se a guide to industry concerni cial policies, programs and p and will seek to stimulate tho members of the defense indust in solving the problems that m in fulfilling the requirements DOD.

Material in the *Bulletin* lected to supply pertinent unel data of interest to the busine munity. Suggestions from i representatives for topics to ered in future issues should warded to the Business & Division.

The *Bulletin* is distributed charge each month to represe of industry and to agencies of partment of Defense, Army, N Air Force. Requests for copies be addressed to the Business & Division, OASD(PA), Room The Pentagon, Washington 20301, telephone, OXford 5-27

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Planning-Programming-Budgeting Systems and Project PRIME

by

LCdr. Steven Lazarus, USN

PPBS stands for Planning-Programming-Budgeting Systems. These words have so pervaded Government in the last year that the letters used by themselves have come to suggest a magical panacea for all management ills. This is unfortunate. When a basically good idea is translated into a "buzz" word, it often suffers from distortion and misinterpretation. If it fails to solve all problems or live up to its inflated billing, it is abruptly discarded. Usually a critic is readily available to pronounce the epitaph—I told you it wouldn't work in the first place.

The purpose of this article is to place PPBS in perspective by briefly describing its historical antecedents in DOD; outlining the process as it was implemented and refined from 1961 to 1965; and, most importantly, describing the changes which are being made in it in DOD under the collective name of Project PRIME.

Historical Antecedents.

Control by Legislature. The framers of the Constitution were aware that the British iament in 1688 had abrogated historic right of the king to rais mies in time of peace according to ds own good pleasure. Motivated by the conviction that the American executive should be similarly deprived of the power to raise and the sole power to regulate fleets and armies, the founding fathers expressly provided in Article 1, Section 8 of the Constitution that Congress shall have the power to "provide for the common defense," "raise and support armies," "provide and maintain a navy," and to make all laws necessary to execute these powers.

This "control by legislature" over a single War Department seemed appropriate for the small permanent military establishment contemplated in 1787. But by 1793 the incursions of the barbary pirates had forced Congress to consider the construction of a fleet and the managerial difficulties connected with this enterprise led in part to the establishment in 1798 of the Department of the Navy.

Throughout the 19th century Congress continued to assert its primacy in military affairs through its control of the purse. The President had no statutory authority to act on budgetary matters and, although the Secretary of the Treasury received department estimates, he was required to transmit them to Congress without revision.

The century, however, had also seen a tremendous national expansion, and with the acquisition of territory, the increase in population, and the growth of industry had come a larger and increasingly more complex military establishment.

". . . Predecessors of the so-called technical and staff services of the Army became firmly established as statutory institutions in their own right and created major problems of coordination and command within the War Department itself. A similar trend toward a proliferation of specialties 'ed itself in the Navy, culminating in 1842 with the establishment of the Bureaus which created the same kind of problems within that Department. . . ." [1]

LCdr. Steven Lazarus, SC, USN, is Special Assistant to the Assistant Secretary of Defense (Comptroller). His naval duties have included tours in USS Decatur DD936 and as Budget and Control Officer on the staff of the Commander, Cruiser-Destroyer Force, U. S. Atlantic Fleet. He was graduated from Dartmouth College in 1952 and from the Harvard University Graduate School of Business Administration in 1965 where he was selected as a Baker Scholar.

This organizational form accommodated neatly to the legislative tendency to control by means of hundreds of discrete and separate appropriations. As recipients of specific appropriations, the heads of special activities achieved an almost autonomous status. The content of such appropriations was frequently established through a process of personal negotiation between the chief of a bureau and influential members of the Congressional committees handling the appropriations.

Strengthening the Executive. It was the failure of these organizational structures and management practices during wartime that prompted reform. The managerial difficulties encountered during the Spanish American War led to Secretary of War Root's recommendations of 1903 which, among other things, resulted in the creation of the Office of the Army Chief of Staff. The vast increase in expenditures during World War I made it evident that budgetary reforms were necessary and Congress responded by enacting the Budget and Accounting Act of 1921 which concentrated the responsibility for preparation and transmittal of the executive budget in the hands of the President. By strengthening the executive, the legislative branch was inevitably acquiescing to the curtailment of its own power.

Throughout the 1920's and 1930's the movement toward a unified defense establishment grew stronger and, as Charles Hitch comments, the experience of World War II finally overcame the last opposition. It was also plain that Congress could no longer exercise effective stewardship over the defense establishment by parceling out hundreds of discrete appropriations and by counseling independently with dozens of separate

[1] *Hitch, Charles, "H. Rowan Gaither Lectures in Systems Sciences," 1965.*

military officials. Massive, world-wide, total war demanded integrated and coordinated planning, finding and execution.

Although it was a major step in the right direction, the National Security Act of 1947 proved not quite equal to these tasks and was, therefore, strengthened and amended in 1949. Title IV was added to the Act creating the Office of the Assistant Secretary of Defense (Comptroller) and providing for uniform budget and fiscal procedures throughout the Department. The position of Comptroller was held by W. H. McNeil for 10 years (1949–1959), a record for longevity at such a level. McNeil's skill and energy, coupled with his tenure, enabled him to build selectively upon the recommendations of the first and second Hoover Commissions to lay the foundation for modern financial management in DOD.

The Process from 1961 to 1965.

Relating Costs to Missions. McNeil accomplished much to bring order out of chaos in the DOD management control process, and the reorganizations of 1953 and 1958 further strengthened the position of the Secretary of Defense. The problem, however, was already moving beyond the new systems and structure. The Defense budget was gradually rising toward its current level, new weapon systems were becoming unimaginably expensive, and the quest for a rational method of making choices and balancing forces was becoming imperative.

Congress chafed at its inability to know what it was paying for. Ohio Congressman Clarence Brown, commenting on the 1952 Appropriation Bill, said, ". . . I speak as one of those who is not at all certain just what this Bill provides or what all the items in it mean. . . ."[2] By 1959, Congressman George Mahon, then Chairman of the House Defense Appropriations Subcommittee, was stressing the importance of looking at the Defense program and budget in terms of major military missions, and asking the Secretary of Defense "for more useful information and for a practical means of relating costs to missions. . . ."

Congress was not alone in recognizing these needs. Arthur Smithies, a noted economist, said in 1957, ". . . Neither the Congress, nor the President, nor I suspect the Secretary of Defense and the Service secretaries have the information needed to relate the financial figures in the budget to any meaningful concept of military effectiveness. . . ."[3]

In presenting the Army budget in 1960, General Maxwell Taylor described a mission-oriented budget in terms of six programs, and suggested horizontal cross-Service review. Perhaps the most articulate observer was Charles Hitch, Chief Economist of the Rand Corporation, who crystallized the problem in a book entitled, "The Economics of Defense in the Nuclear Age."

Hitch examined the method of budget formulation, known as the "budget ceiling" approach, which entailed a process of squeezing Service budget requests to make their total fit within an initial overall limitation established by the Bureau of the Budget acting for the President. He found that "its consequences were precisely what could have been predicted:

"1. Each service tended to exercise its own priorities:

"a. Favoring its own unique missions to the detriment of joint missions;

"b. Striving to lay the ground work for an increased share of the budget in future years by concentrating on alluring new weapon systems; and

"c. Protecting the over-all size of its own forces even at the cost of readiness. . . .

"2. Because attention was focuse on only the next fiscal year, the serv ices had every incentive to propos large numbers of 'new starts,' the ful cost dimensions of which would onl become apparent in subsequen years. . . .

"3. Almost complete separation be tween budgeting and military plan ning.

"a. These critically important func tions were performed by two differen groups of people. . . .

"b. Budget control was exercise by the Secretary of Defense, but plan ning remained essentially in the serv ices. . . .

"c. Whereas the planning horizo extended four or more years into th future, the budget was projected onl one year ahead. . . .

"d. Planning was done in term of . . . outputs; budgeting . . . i terms of inputs. . . .

"e. Budgeting, however crudely faced up to fiscal realities; the plan ning was fiscally unrealistic, an therefore of little help to the decision maker. . . .

"f. Military requirements tende to be stated in absolute terms, without reference to their costs."[4]

[2]*Kolodziej, Edward A., "The Uncommon Defense and Congress" 1945-1963.*

[3]*NAVEXOS P-2416, Aug. 1962.*

[4]*Hitch, Charles J., "Decision Making for Defense," Berkeley: 1966, pp. 24-26. For further discussion of these same points, see David Novick (editor), "Program Budgeting: Program Analysis and the Federal Government," Cambridge: Harvard University Press, 1965, pp. 81-110.*

FIVE YEAR DEFENSE PROGRAM*

New	*Old*
I. Strategic Forces	Strategic Offensive Forces
II. General Purpose Forces	Continental Air & Missile Defense Forces
III. Specialized Activities (Includes MAP)	General Purpose Forces
IV. Airlift and Sealift	Airlift/Sealift Forces
V. Guard and Reserve Forces	Reserve and Guard Forces
VI. Research and Development	Research and Development
VII. Logistics	General Support
VIII. Personnel Support	Retired Pay
IX. Administration	Military Assistance

* For explanation of changes, see DOD publication, "A Primer on Project PRIME," Nov. 1966, pp. 34–35, available from the Office of Asst. Secretary of Defense (Comptroller), Room 3B857, The Pentagon, Washington, D.C.

Figure 1.

New Guidance. In 1961, President Kennedy abandoned the budget-ceiling approach as far as Defense was concerned. He gave his new Secretary of Defense, Robert McNamara, two general instructions:

- Develop the military force structure necessary to support our foreign policy without regard to arbitrary budget ceilings.
- Procure and operate this force at the lowest possible cost.

Charles Hitch became McNamara's Assistant Secretary of Defense (Comptroller) and clearly stated what was required to translate this guidance into action:

"We need an economically realistic future program so that long-lead decisions on program components will have a reasonable chance of turning out to be right. To develop such a program, it is essential that the decision makers have before them the total cost implications of alternatives—not only total in the sense of cutting across appropriation categories, but also in the sense of being projected forward over a five-year period."[5]

Hitch, aided by some able systems designers, developed such a mechanism—the Five-Year Defense Program—in the phenomenal time of about six months. He also established two new organizational elements—a programming division to superintend the Five-Year Defense Program, and a systems analysis division to conduct analytic comparisons of alternative inputs to that program.

PPBS. The mechanism was a three-phase operation: planning-programming-budgeting. The first phase—planning and requirements determination—was to be a year-round operation initiated by the Joint Strategic Objectives Plan proposed by the Joint Chiefs of Staff. It was to consist of military economic studies which would compare alternative methods of accomplishing national security objectives to determine the one that contributes the most for a given cost or achieves a given objective for the least cost. Today these are commonly called cost-effectiveness studies or systems analyses.

The second phase—the programming system—integrated combinations of men, equipment and installations into program elements whose effectiveness could be measured as a whole and related to national security objectives. The B-52 bomber force with all its resources was one such element. The elements were aggregated into the major missions of the Defense Department. Each aggregation had a common set of purposes and could, for decision making, be treated as a whole. In 1965, there were nine such aggregations or programs (Figure 1).

A mechanism which allowed for continuous update and change was provided, and data were projected for eight years in the case of military forces, and for five years in all other cases. This immense amount of data under continuous change required computerization in order to remain manageable. The availability of modern data processing equipment made feasible what otherwise would have been an impossible task.

The budget process was not susceptible to rapid alteration and, therefore, remained structured in terms of object classes, vast accumulations of inputs such as military personnel, procurement, etc. It was necessary to translate the program into budget terms by means of a "torque conversion" or matrix which broke the program into various appropriations categories. The accounting systems of DOD were also aligned with the budget structure, and thus progress reporting related to the program had to be accomplished by means of special studies and separate reports. The programming system had filled a vital planning need but, as yet, was unable to serve the needs of field managers.

In 1965, Robert N. Anthony became Assistant Secretary of Defense (Comptroller). It was to be Anthony's task to build upon the foundation of the programming system and create within DOD a management control system which would serve the needs of managers at all levels from the Congressman to the corporal.

Project PRIME.

Progress Against Plan. In 1955, the second Hoover Commission on Organization of the Executive Branch of the Government made a series of recommendations for changes in accounting and budgeting procedures. Among these were suggestions that operating budgets be cost based and that Government accounting be kept on the accrual basis to show currently, completely and clearly all resources and liabilities, and the costs of operations. These particular recommendations were adopted and enacted in 1956 as Public Law 863.

As late as 1965, Charles Hitch had reflected that ". . . Ideally, I suppose, the program should be costed in terms of accrued expenditure, which is closest to the concept of resources consumed. However, the accounting difficulties appeared so overwhelming that we did not attempt that approach. . . ."[6]

Finally, President Johnson asked that the pace of the Joint Financial Management Improvement Program be accelerated, and in a special memorandum asked each agency to ". . . see that the Agency's managers are given the basic tools they need—responsibility centered cost-based operating budgets and financial reports. . . ."

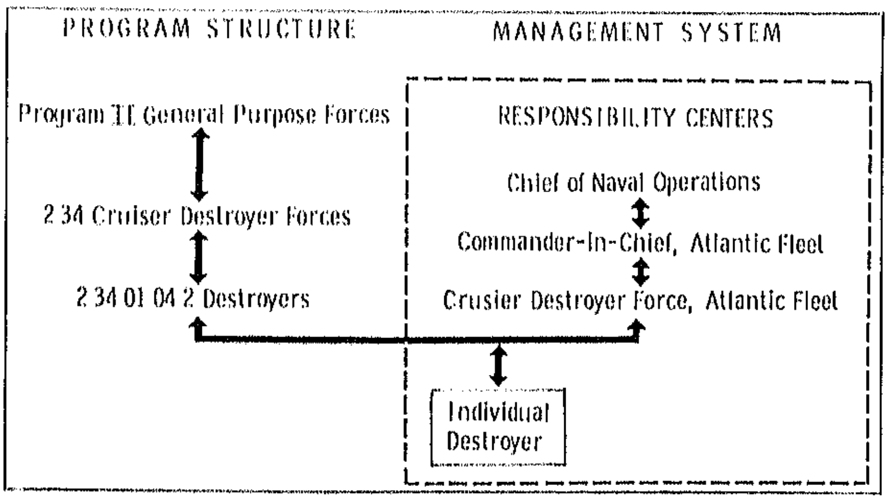


Figure 2.

[5] *Ibid.*

[6] *Hitch, op. cit.*

Operating Costs. Anthony began by defining the problem in order to reduce it to manageable proportions. He identified two essential different types of cost—investment costs and operating costs—used in DOD management. Investment costs related to items such as ships, planes and facilities which maintained their identity during their cycle of use and were financed by means of "continuing" appropriations. These were planned for and managed on an individual item basis. They were treated consistently in both programs and budget and, thus, no significant changes were contemplated in their case.

Full attention was then focused on operating costs—the costs of the labor, materials and services required to operate the Defense establishments.

The first goal was to achieve a correspondence in terms of operating costs among program, budget, accounting system, and reporting system. Such consistency would eliminate the necessity for the unrewarding process of "torque conversion," would lay the groundwork for budget submission to Congress in mission-oriented terms, and would create within the accounting system the capability for progress reporting back against the program.

In order to do this, a single entity would have to serve as the basic unit, or building block, of both program and management system. This was achieved by revising the content of the Five Year Defense Program and defining program elements very carefully. The revised program structure is shown in Figure 1. The synchronization is demonstrated in Figure 2.

The second goal was to charge an organization with 100 percent of the measurable expenses that it incurred, and to account thereafter in terms of expenses. Such an accounting would yield hard, actual and total cost data to the planners working on revisions to the program and, simultaneously, would display to the manager the full cost of his activity. It would, additionally, show the Congressman what his operating appropriations were buying. Finally, it would give managers throughout DOD the ability to determine the real costs of specific missions, to measure actual performance against planned performance, and to relate resources consumed to work done.

While rough approximations of these relationships could have been made in the past using statistical prorations and special studies, what was now proposed was to derive them routinely and accurately by means of a disciplined debit and credit accounting system.

Basically, four steps were necessary to accomplish this goal:

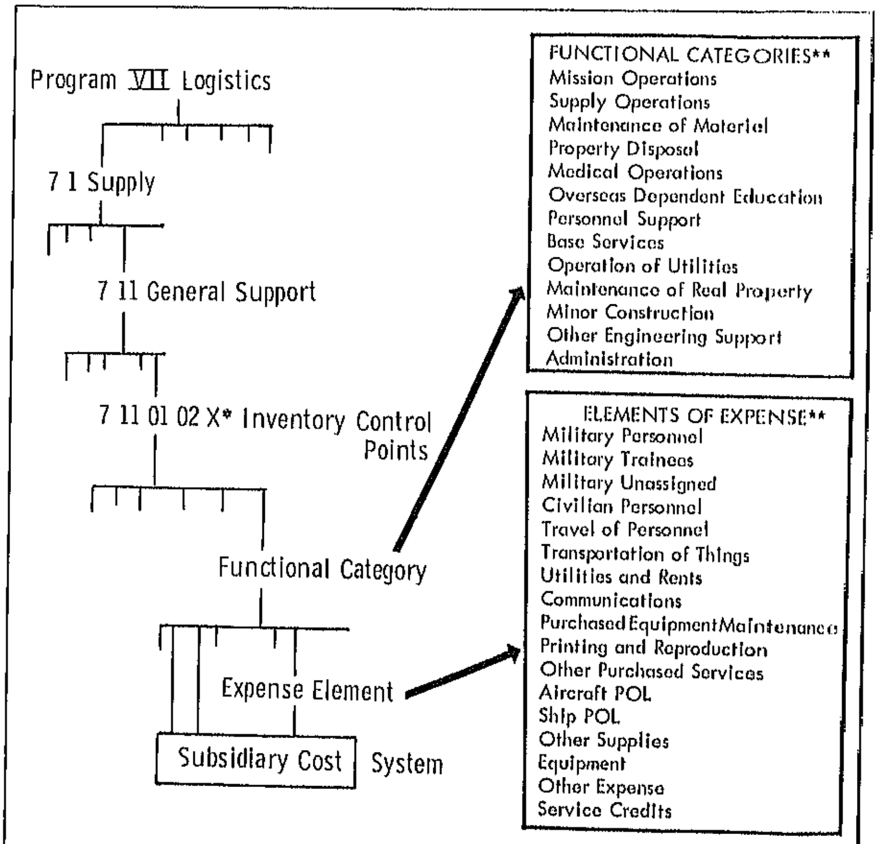
- Revise the accounts structure.
- Charge military personnel costs to organization units.
- Purify the appropriation definitions so as to include only items of an expense nature in the operating appropriation.
- Extend the use of working capital mechanism to encompass all items of an expense nature.

The Four Changes. A uniform account structure has been developed and will provide a common basis for the Military Departments and Defense Agencies to report expenses. It is only a skeleton and each DOD component has developed, or is developing, amplifying systems to meet its own management needs. The basic accounting structure ties directly back to the Five Year Defense Program as shown in Figure 3.

Functional categories will serve the purposes of functional managers and aggregate to program element. Expense elements will replace object classes as the basic modules in the accounting system. There will also be subsidiary cost systems such as one for wholesale supply depots which will subdivide functional categories into subfunctional breakdowns. Such breakdowns will supplement, but not replace, accounting by expense element.

Military personnel costs will be charged to the using activity by means of a standard cost. This will have the effect of costing at the user level the largest single category of operating resources not now so charged. It is hoped that DOD will be

(*Continued on Page 31*)



* Indicates DOD component identified --Army, Navy, Air Force, etc.
** For definitions, see DOD Instruction 7220.20, "Expense Data Requirements," December 20, 1966.

Figure 3.

Contractor's Weighted Average Share Concept

by

Robert D. Lyons

A novel procurement management concept known as the Contractor's Weighted Average Share (CWAS) is incorporated in Defense Procurement Circular No. 50, dated Dec. 30, 1966. This concept seeks to foster and rely upon the use of high-risk contracts to motivate prudent management decisions in the incurrence of costs. It is a management technique which enables the Government to identify and distinguish between high-risk and low-risk procurement environments by contractors' profit centers in a logical way, thus allowing a more discreet application of scarce resources. The underlying philosophy, objectives, mechanics and some of the benefits anticipated for both Government and industry will be discussed in this article.

DOD has made remarkable progress in the past five years in creating a new procurement environment within the defense industry complex. During this period the burden of risk has been substantially shifting from the Government to defense contractors through refinement in procurement techniques and the utilization of more firm fixed-price and incentive contracts, resulting in a dramatic reduction in the use of cost-plus-a-fixed-fee (CPFF) contracts from 36.6 percent of our procurement dollars in FY 1961 to 9.9 percent in FY 1966.

During the era of high CPFF contracting, many administrative, cost and audit controls were imposed on industry since this form of contracting did not provide sufficient motivation for prudent cost management on the part of contractors. As DOD moved further and further into the new procurement environment, however, it became increasingly apparent to many managers that our administrative practices were not attuned to the new situation. Thus, while encouraging contractors on the one hand to agree to higher-risk contracts, we, on the other hand, continued to do business in much the same old way. Now that there is an increase in the use of higher-risk contracts, it is considered feasible and desirable to measure the cost risk motivations imposed on individual contractors as evidenced by the mix of contracts being performed in a profit center and, whenever practical, to eliminate administrative controls and reasonableness overhead audits on those contractors who attain a verifiable "weighted average share" of risk which meets a prescribed threshold. This concept is based on the premise that good management by industry properly motivated to cost consciousness can accomplish much more effective control of costs than can detailed review, control and overhead audit by Government personnel. We believe that we can rely with confidence on the decisions of management in those profit centers which meet our prescribed "high-risk" standards.

The objectives of CWAS, as set forth in Defense Procurement Circular No. 50, are:

- To furnish a measure of an individual contractor's risk motivation, as provided by types of contracts, to conduct his business prudently and with maximum economy.
- To offer additional inducement to a contractor to accept higher risk type contracts.
- To minimize the extent of Government control, including controls exercised through DOD prime contracts and subcontracts thereunder, thereby reducing Government costs.
- To provide a simple, uniform procedure for determining a contractor's assumption of cost risk that can be applied equitably to all defense contractors who desire to participate by voluntarily submitting pertinent data.
- To provide a means for directing audit and other DOD management efforts to those areas where they are most needed because of a greater degree of Government risk.
- To provide a basis for determining that indirect costs, incurred during the applicable period by a contractor whose CWAS rating is above a predetermined threshold, are reasonable and, therefore, reimbursable if otherwise allowable and allocable.

Robert D. Lyons is Director for Procurement Management in the Office of the Assistant Secretary of Defense (Installations & Logistics). Prior to assuming this position in 1962, he served as Assistant Director for Procurement and Production with the Air Force Logistics Command. Mr. Lyons is a graduate of Harvard University and holds a Masters Degree in Business Administration.

The CWAS concept consists of two basic elements:

- The computation of a CWAS rating, i.e., the contractor's average share in cost risk. Each contractor will have his own CWAS rating for each profit center, and those with more than one profit center will also compute a corporate CWAS rating.
- The establishment of a threshold which will delineate the procurement environment and allow more discrimination in the use of DOD and contractor resources. The established threshold will apply to all qualifying contractors.

Defense procurement regulations contain many references equating contractor responsibility and costs of performance to types of contracts. A contractor having all his business with the Government on a CPFF basis is essentially different, in terms of motivation for cost control, from one having only competitive fixed-price business. Based on this premise, the technique for structuring CWAS is relatively simple, namely, measure the contractor's risk by applying simple weights to the type of contracts being performed in each profit center and the corporation as a whole. Thus we assign a zero percent weight to the CPFF contracts at one end of the spectrum and 100 percent to competitive fixed-price contracts

and commercial business at the other end, and weight these by costs incurred. (Cost of sales may be substituted when appropriate.) Other types of contracts are scaled in between. Reasonable men could argue for slight variations but, in our judgment, the factors assigned to types of contracts are appropriate.

Application of CWAS.

The CWAS technique will be available to all contractors on a voluntary basis.

A contractor or subcontractor, desiring to participate, may do so by determining his own CWAS rating and submitting data for verification.

The Armed Services Procurement Regulation (ASPR) provides for validation of a CWAS rating by the Defense Contract Audit Agency, or an independent public accountant, and approval by the administrative contracting officer.

CWAS may be withdrawn pursuant to a finding of fraud, misrepresentation, or other abuse on the approval by the head of the procuring activity, and it may be denied under any circumstances by a decision at the Secretarial level.

Each Defense Contract Administration Services Region (DCASR) will maintain a register of CWAS ratings in its area and a master register will be maintained in Washington.

Procedure for Determining CWAS.

CWAS will be determined by the following method:

- Determine the total dollar costs incurred for commercial work and for the various Government specific types of contracts for the fiscal year just ended.
- Multiply these costs incurred by the approved percentage factor for the respective contract types. This becomes the contractor's "dollar cost risk."

[illegible] contractor dol- [illegible] pective types [illegible] ult by [illegible] rating.

Approved Percentage Factors.

The percentage factors to be used in determining the contractor's dollar cost risk by type of contract are as follows:

Type of Contract	Percentage Factor
Letter Contracts, Time and Material, Labor Hour, Cost Only, CPFF	Zero
Cost Sharing	Share Line
Cost Plus Incentive Fee	15
Fixed Price Redeterminable (Retroactive)	50
Fixed Price Incentive (Successive Target)	55
Fixed Price Incentive (Firm Target)	Per Formula*
Fixed Price Redeterminable (Prospective)	80
Fixed Price with Escalation—Non-competitive	80
Firm Fixed Price—Non-competitive	80
Fixed Price with Escalation—Competitive	100
Firm Fixed Price—Competitive	100
Commercial	100

*Varies depending on ceiling and share line. A typical fixed-price incentive contract with a 118 percent ceiling and a 30 percent share would bear a factor of 65 percent.

CWAS Computation.

A simplified example of a CWAS computation is shown in Figure 1.

Based on this procedure, at some point on the spectrum from zero to 100, we can draw a line and be satisfied that we have identified and separated one meaningful procurement environment from the other. This line is referred to as the "threshold" and it is this threshold which will enable us to better utilize our management resources in the future to relate the degree of control with the need to control. When the threshold was developed, it was considered that a sound threshold would require the following characteristics:

- It would be low enough to have a significant impact in reduction of Government workload.
- It would be high enough to assure that contractor motivation could reasonably be relied upon.

As a result of a comprehensive study of 568 separate profit centers with approximately $20 billion in Government contracts (including National Aeronautics and Space Administration, Atomic Energy Commission, etc.) and other rationale, an initial threshold of 65, with a discretion band (CWAS subject to Government approval) in the range of 50 to 64, has been adopted. The CWAS threshold may be viewed graphically as shown in Figure 2.

A contractor having a 50 percent CWAS rating can be said to have one of his own overhead dollars involved with each Government overhead dollar expended. This rationale can be relied upon to stimulate prudent contractor management of overhead expenditures. At 65 percent, a contractor has two dollars at issue for every Government dollar, in which case there is a strong presumption of prudent management influence. Thus the selection of the 65 percent CWAS threshold was purposely directed toward initiating the CWAS program on a conservative basis. A large percentage of smaller and intermediate companies can be expected to qualify initially,

Type of Contract	*Prior Year's Costs Incurred*	*Percentage Factor*	*Contractor's Dollar Risk*
Time and Material	$ 50,000	0	$ 0
Cost Plus Fixed Fee	200,000	0	0
Cost Plus Incentive Fee	300,000	15	45,000
Fixed Price Incentive (118 percent Ceiling, 30 percent Share)	200,000	65	130,000
Fixed Price, Competitive	100,000	100	100,000
Commercial	150,000	100	150,000
	$1,000,000		$425,000

$425,000 ÷ $1,000,000 = 42.5 CWAS rating

Figure 1.

while a smaller percentage of the large profit centers may qualify. The threshold, of course, can be adjusted with experience.

It should be emphasized that CWAS is based on risk as expressed by the preferred types of contracts authorized by ASPR. CWAS also recognizes the force of price competition by assigning a 100 percent factor to fixed-price competitive contracts as against an 80 percent factor for fixed-price non-competitive negotiated contracts. Further, before CWAS becomes operable, 35 points or more of the overall rating must be derived from competitive firm fixed-price contracts and commercial sales.

We believe that the most beneficial results of CWAS will derive initially in providing a basis for determining the reasonableness of certain indirect costs. These are, for the most part, those for which we have previously set limitations because of our preoccupation with the CPFF environment. However, it will be useful for other items, the reasonableness of which are difficult to judge as, for example, salaries and fringe benefits. It should be clearly understood that CWAS applies only to indirect costs and audits will still be performed, when appropriate, to assure that costs have, in fact, been properly incurred and are lodged in the proper accounts and are allocable. In short, CWAS is a test of reasonableness for certain specified indirect costs. It should result in eliminating uncertainties and inequities, and permit a more consistent and uniform approach in the future to the treatment of certain portions of overhead.

It should also be emphasized that CWAS is applied to a profit center as a whole, not to individual contracts within a profit center. This is essential since the indirect expenses of a profit center are allocated to all work in the profit center and can only be controlled effectively by an overall control. Indirect expenses generally are not controllable on a contract-by-contract basis. CWAS is either applicable to all contracts or none in a given profit center. CWAS in this respect can be described as a workload management technique; it should permit us to redirect our efforts toward those contractors engaged primarily in low-risk contracts.

A new ASPR paragraph 15-201.3 (b) provides direction for the application of CWAS as a test of reasonableness of certain indirect contract costs. The applicablility of CWAS to selected costs is provided in changes to paragraph 15-205. Those cost principles, which are designated "defer," are currently under consideration for revision by the ASPR Committee. The application or non-application of CWAS to such costs will be provided subsequently when these revisions are approved for printing. Pending such determination, CWAS shall not be used as the sole test of reasonableness in connection with such deferred costs. In the event the reasonableness of a CWAS-designated cost is predetermined by advance agreement, such agreement will govern allowability for the remainder of the term of the agreement.

This concept will also be applied to relaxation of certain administrative controls but this will represent a long-term effort. There are proposals presently before the ASPR Committee to make CWAS applicable to indirect overtime, review of contractors' procurement systems, and consent to subcontracting. We have concluded, however, after lengthy study and some selected tests on "disengagement" conducted by the Air Force, that the problem of over-control—and, hence, indiscreet use of Government personnel and money—is sourced principally in administrative documents other than the ASPR. We think CWAS can be of assistance particularly in those areas where controls or marginally effective Government reviews are typically applied across the board without adjustment to give recognition to the contractor's business environment. Without something like CWAS, we really don't have any practical way to direct the efforts of our own professionals to the Government's best advantage, nor do we have a means of insuring consistent treatment as between different contractors.

Accordingly, under the aegis of a revised DOD Directive 5126.34, dated July 27, 1966, we are planning to initiate a Contract Administration Review Program in calendar year 1967 to encompass both the National Plant Cognizance plants and the DCASR's. The Military Departments and the Defense Supply Agency are now coordinating proposals for this effort and a DOD program manual has been prepared for internal and uniform guidance for these professional review teams.

The manual incorporates the CWAS concept, but the application has been somewhat modified. We intend to differentiate between high-risk, intermediate and low-risk procurement environments. This is readily determinable in a National Plant and can be accomplished on a sampling basis in the DCASR's. We will use this concept to query why various controls, reviews and procedures have been established for differing procurement situations. If a review team finds, for example, that controls designed for a low-risk procurement situation are also being applied to high-risk contractors, it will make strong recommendations for disengagement and better utilization of our resources. Hence CWAS, in this context, provides us with a very useful device for the first time in determining why we should or should not be doing certain things in our field administration. We look for evolutionary improvement in this important management area.

We are confident that industry will cooperate in the CWAS program and that DOD personnel will continue to identify other procurement and contract administration areas that may be candidates for this concept. CWAS should eventually be useful as a guideline in other DOD functional endeavors as it is better understood for it is a work management technique inherently related to risk.

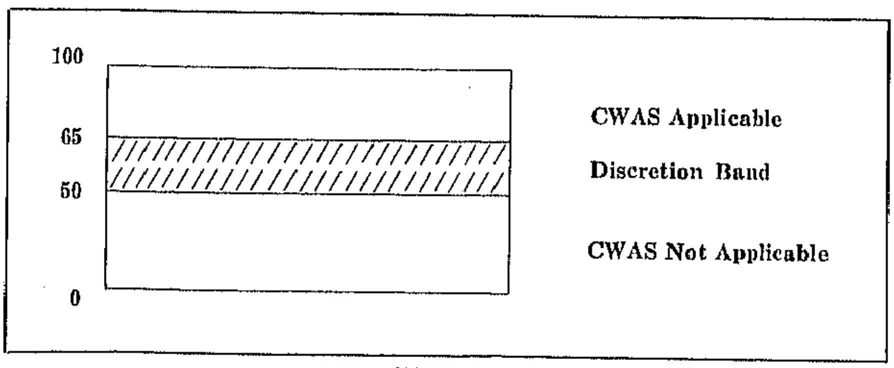


Figure 2.

GAO Urges Improved Contractor Estimating Systems

by

Stewart Collins
Directorate for Audit Systems
Office of Asst. Secretary of Defense (Comptroller)

In a briefing given to key officials of the Office of the Secretary of Defense on Nov. 2, 1966, representatives of the General Accounting Office (GAO) encouraged the Defense Department to take leadership in a program for improving and formalizing contractor estimating systems. GAO's interest in contractor estimating systems arose from a survey of the Defense Contract Audit Agency which has responsibility, under the Armed Services Procurement Regulation, to establish and manage a program to review contractor estimating systems.

The tabulation in the chart below, taken from one of several charts exhibited during the briefing, typifies the conditions found by the GAO in its survey regarding estimating systems. Some contractors had fairly well developed systems, while others had little or no written guidance or methods for estimating.

The GAO position was that any contractor should, as a matter of sound business practice, have a good estimating system. In essence, GAO officials stated that estimating systems would help the contractor manage the preparation of his proposals, and that DOD should place more emphasis on determining how well the contractor is doing this rather than reviewing the contractor's proposals in more detail than would otherwise be necessary.

Some of the points made during the briefing were:

- Because of the financial stake industry has in the outcome of its contracts, top management, as well as the stockholders, should have a vital interest in a well developed estimating system for preparation of price proposals.
- Where the estimating process is poorly designed or described, both the contractor and DOD should be concerned about what governs the quality of the cost and pricing data found in the proposals.
- Proper management should provide that all important procedures and methods be reduced to writing and periodically tested to assure compliance and effectiveness, and that management policies are being carried out at all levels of the organization.
- Although interpretative and ad-

ANALYSIS OF CONTRACTORS' WRITTEN ESTIMATING SYSTEMS

	Contractor A	Contractor B	Contractor C
• Company has policy statement.	Yes	Yes	Yes
• Pinpoints responsibility for:			
• Origination of estimates.	Yes	Very generalized	No
• Review of estimates.	Yes	Very generalized	No
• Approval of estimates.	Yes	Very generalized	No
• Provides for coordination and communication of information between departments.	Yes	Yes	No
• Contains guidance for estimating cost and pricing data.	Describes the step-by-step preparation of the proposal, identifies which internal organization is responsible for performing each step, discloses the source of the data, and shows the various review and approval points. The steps, of which there are 147, include guidance for the following: • Preparation of bill of material. • Segregating of make-and-buy items. • Obtaining and reviewing quotations. • Prices for common hardware. • Establishment of labor operations. • Establishment of labor standards. • Basis for determining labor adjustment factors. • Development of overhead and G&A rates.	Little guidance, e.g., the sole guidance for estimates of material is to use firm price quotations "as appropriate."	No
• Requires management approval for significant deviations.	No	Yes	No

ministrative problems under Public Law 87-653 will probably continue for some time in the future, a well developed estimating system should reduce these problems. For example, estimating systems can increase the level of acceptance of proposals and help the contractor determine when, under his record-keeping system, he can assume full responsibility for the currency of his cost and pricing data.

- Well developed estimating systems would help the contractor arrive at the lowest possible price he can quote in a competitive situation. In view of the DOD trend toward obtaining more competition, this would enhance the contractor's ability to obtain work under competitive conditions.
- With respect to review and negotiation of prices, the lack of acceptable estimating systems can result in numerous unnecessary questions by the auditor, technical personnel and negotiators, the resolution of which both frustrates and lengthens the review and negotiation process. Acceptable estimating systems would tend to reduce these questions and the amount and length of audit. This shortening of the procurement process would, in turn, help to minimize the need for updating of proposals.
- The contractor's estimating processes need not be explained on each and every proposal. Instead, comprehensive reviews of estimating systems, which are fully integrated with reviews of individual proposals, would be a more practical way of reviewing the contractor's estimating process.
- The resultant improvement in data in pricing proposals could help to reduce the number and depth of post-award audits by both DOD and GAO.

It was emphasized that an improved estimating system should not be considered as a substitute for a proper audit or for compliance with the requirements of Public Law 87-653.

Formal estimating systems, it was pointed out, would not, as some contractors have contended, reduce flexibility or the exercise of judgment in submitting proposals to the Government. On the contrary, the estimating system could be flexible enough to fit the type of procurement and actually give management a better basis upon which to make judgments. Further, it was noted that no one uniform method of estimating was contemplated and that each contractor could have complete freedom to develop his estimating system in such a manner as to meet certain minimum standards of acceptability, taking into consideration such things as the nature and size of his business, type of organization, and method of record keeping.

GAO recognized that improved estimating systems would not solve all procurement and audit problems, but they would make life a little easier for everyone concerned.

Organizational Changes Effected in OASD (I&L)

Changes in the organizational structure of the Office of the Assistant Secretary of Defense (Installations and Logistics)—OASD(I&L)—became effective Dec. 19, coinciding with the departure of Robert C. Moot, Deputy Assistant Secretary of Defense (Logistics Services). Mr. Moot has been appointed Deputy Assistant Administrator of the Small Business Administration.

The transportation and warehousing, telecommunications, cost reduction, and food service areas of OASD (I&L), which were under the direction of Mr. Moot, will be assigned to Deputy Assistant Secretary Paul H. Riley. Mr. Riley will also assume responsibility for technical data and standardization and will continue to be responsible for supply management activities.

Deputy Assistant Secretary Glenn V. Gibson will assume responsibility for contract support services, formerly under Mr. Moot, as well as direction of all administrative activities for the Assistant Secretary. Mr. Gibson will continue to be responsible for international programs functions.

Major General A. T. Stanwix-Hay, who has served as the Special Assistant Secretary, has been designated a Deputy Assistant Secretary with responsibility for the functions of the weapons analysis and readiness component of OASD(I&L), previously under the supervision of Mr. Riley.

Eckard Bennewitz, former Director of Weapons Analysis and Readiness, has been assigned as the Special Assistant to the Assistant Secretary.

PROJECT HINDSIGHT AN INTERIM REPORT

The first interim report on the findings of Project Hindsight, a two-and-one-half-year study of the utilization of results from research in science and technology, has been issued by the Director of Defense Research and Engineering.

Authorized contractors may obtain the Project Hindsight interim report (Order No. AD 642-400) without charge from the Defense Documentation Center, Cameron Station, Alexandria, Va. 22314. It can also be purchased from the Clearinghouse for Federal Scientific and Technical Information, Department of Commerce, Springfield, Va., $1 per copy.

Project Hindsight, as the name implies, is a retrospective study of recent scientific and technological advances which have been used by DOD in weapon system developments. The study is directed toward gaining a more objective understanding of DOD utilization of science and technology. Specifically, it is intended to determine procedures through which productivity of DOD's research and exploratory development programs may be improved.

Data for the Project Hindsight interim report was complied by teams of in-house scientists and engineers working with defense contractors who volunteered their assistance. Available detailed information supports the following general conclusions:

- Successful engineering design of advanced weapon systems primarily consists of skillfully selecting and integrating many elements from diverse technologies so as to produce the high performance demanded.
- At least in the systems studied, the contribution from post-1945 research efforts in science and technology were greatest when those efforts were oriented toward defense needs.
- Production of scientific and technical information utilized in weapon systems has been substantially more efficient when research efforts were funded and managed by DOD or defense contractors for DOD purposes, than when funded and managed by the non-defense sector of Government or industry without specific concern for defense needs.
- For the systems studied, approximately two-thirds of the innovations essential to the successful development of those systems were available at the time engineering design was initiated.
- The DOD investment in science and technology has had a demonstrably large payoff in terms of the resultant weapon system cost effectiveness.

DEPARTMENT OF DEFENSE

The **President** has announced the resignation of **Arthur Sylvester**, Asst. Secretary of Defense (Public Affairs), to be effective Feb. 3. In making the announcement, the President stated that he intended to nominate **Phil G. Goulding**, now Dep. Asst. Secretary of Defense (Public Affairs), as Mr. Sylvester's successor.

Gordon H. Tyler, who has been serving as Asst. Dir. of Procurement (Policy & Review) of the National Aeronautics and Space Administration, has been selected for the position of Executive Secretary of the Defense Industry Advisory Council.

Maj. Gen Autrey J. Maroun, USA, has Been designated Dep. Asst. Secretary of Defense (Reserve Affairs), Office of Asst. Secretary of Defense (Manpower).

Col. Richard M. Scott, USAF, has been assigned as the Principal Military Asst. to the Asst. Secretary of Defense (Atomic Energy).

Col. James S. Douglas, USA, has has been assigned to the Business & Labor Div., Directorate for Community Relations, Office of Asst. Secretary of Defense (Public Affairs).

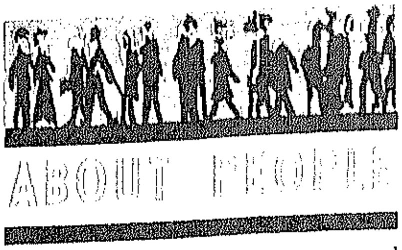
The following assignments have been made by the Defense Supply Agency:

Col. Cloyd L. Abney, USAF, Dir., Procurement & Production, Defense Industrial Supply Center, Philadelphia, Pa.; **Col. James R. Root, USAF**, Dir., Commodity Procurement & Production, Defense Fuel Supply Center, Alexandria, Va.; **Col. Francis P. Fitzgerald, USAF**, Dir., Procurement & Production, Defense General Supply Center, Richmond, Va.; **Col. Kenneth A. Young, USAF**, Dir., Technical Operations, Defense Construction Supply Center, Columbus, Ohio; **Col. Robert B. Ladd, USAF**, Commander, Defense Depot, Ogden, Utah,

Col. Fred Capio Jr., USAF, has been named Chief, Material Management Div., and **Col. John W. Roberts, USAF**, has been named Chief, Airborne Systems Div., of the Defense Communications Agency Planning Group.

DEPARTMENT OF THE ARMY

[illegible] **Jr.**, has



William A. Yauss has been named Chief of the Electrical Engineering Div., of the Army Mobility Equipment Command's Engineer Research & Development Laboratories, Fort Belvoir, Va.

W. Carter Hall has been promoted to the position of Chief, Research & Development Procurement Office, Army Mobility Equipment Command, Engineer Research & Development Laboratories, Fort Belvoir, Va.

Col. Nicholas C. Angel, has assumed command of the U.S. Army Electronic Proving Ground, Fort Huachuca, Ariz.

Col. Chester A. Hall Jr., has become Dir., Army Electronic Proving Ground Test Directorate, succeeding Col. Willis E. Kooken.

Col. Charles S. Johnson Jr., has been appointed Chief, Review & Analysis Div., Plans & Programs Directorate, Office of the Chief of Research & Development, Department of the Army.

Col. Chester H. Johnson has assumed duties as Dep. Commander, Army Weapons Command, Rock Island, Ill.

The following have been assigned to key posts with the Army's Strategic Communications Command: **Col. William Minton**, Dep. Chief of Staff Operations, and **Col. E. J. Quashnock**, Dir. of Communications Engineering Department.

Col. Paul R. Sheffield will become Dep. Div. Engineer, Lower Mississippi Valley Div., Army Corps of Engineers, and Secretary, Mississippi River Commission, with headquarters at Vicksburg, Miss., on Feb. 15, 1967.

The following assignments have been made by the Army Missile Command, Redstone Arsenal, Huntsville, Ala.:

Col. John T. O'Keefe, Special Assistant to the Commanding General of the Army Missile Command; **Col. James N. Lothrop**, Project Manager, TOW Weapon System; **Lt. Col. Ed Radd**, Project Manager, Pershing Missile System; **Lt. Col. Arthur G. Lange Jr.**, Project Manager, Sergeant Ballistic Missile System; **and Lt. Col. Elbert W. Powell**, new deputy to the Dep Commanding General, Land Combat Systems; **Col. Sterling C. Holmes** Dir. of the Army Missile Command's Procurement & Production Directorate, vice **Col. Eugene J. McGinnis**.

DEPARTMENT OF THE NAV

The following assignments h been made at the U.S. Naval Shipya Philadelphia, Pa.:

Capt. R. W. Miche Jr., Product Officer; **Capt. G. H. Jones**, Plann Officer; **Capt. J. A. Cash**, Construct Program Manager; and **Cdr W. Sawtelle**, Repair Superintendent.

DEPARTMENT OF THE AIR FORCE

Col. Walter R. Taliaferro has b named Dir. of the Titan III P gram succeeding Col. David V. Mill

Col. Joseph L. Campbell has b assigned as Dep. for Civil Enginee ing, Space Systems Div., Air Fo Systems Command

Col. George G. Getz, has been signed as Special Asst. to the D for Communications Systems, El tronic Systems Div., Air Force S tems Command

Col. Vance T. Gulino, is the n Chief, Data Processing Div., Air Fo Logistics Command Data Cent Wright-Patterson AFB, Ohio.

Col. Vernon R. Turner has been signed as Dep. Asst. for Logist Planning, Deputy Chief of Staff of Systems & Logistics at USAF headqu ters.

STRATCOM Headquarter Will Move to Arizona

Headquarters of the U.S. Ar Strategic Communications Command (STRATCOM) will be moved from Washington, D.C., area to F Huachuca, Ariz., with the move to be completed by end of 1967.

The move of STRATCOM headquarters is being made to provide a perma[illegible] station for the headquarters and to consolidate, in one location, all elements of the headquarters presently scattered at several sites in the Washington area. The headquarters has combined strength of about [illegible] military and civilian personnel.

The location of STRATCOM headquarters in existing facilities at Fort Huachuca, a communications-electronics post since 1954, provides environment that will enhance the capability of STRATCOM headquarters to carry out its mission of directing the Army's portion of the world-wide defense communications systems.

Management Information Systems: The Lifeblood of Management

by

RAdm. T. J. Rudden, USN

No longer does a top manager have to make decisions based on intuition or ancient history. Now a wealth of projection techniques and automated data processing systems bring real time information to his finger tips. He can now be the leader of his organization and make decisions based on timely, accurate and reliable information. The purpose of this article is to show how the Headquarters, Naval Material Command (NAVMAT) utilizes management information systems to manage its business.

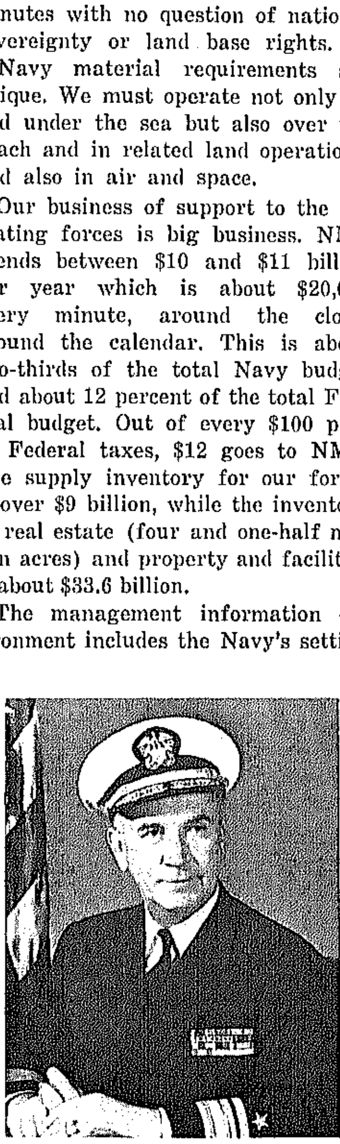
The business of the Naval Material Command (NMC) is to provide material support (ships, weapons, aircraft, etc.) to the operating forces of the Navy and the Marine Corps. These forces comprise the world's largest and most powerful Navy with about 1,000,000 sailors and marines, more than 900 ships of all types with no two precisely identical, and about 8,400 aircraft of 235 different types. Our missions require a highly mobile, world-wide, changing mix of weapons and equipment which can be tailored to meet any situation such as existed at Lebanon, the Cuban Crisis, and now in Vietnam with a long-range flow of material support 7,000 miles across the Pacific.

Some of our weapon systems, such as a ship, have a long life and high investment. Some carriers on the Vietnam station are now in their third war and older than most of their crew. These long-life systems must keep up with advances in technology to be responsive to new and changing requirements. A major fleet unit like a carrier has in it more material, more different kinds of things from more different places than any land vehicle, any aircraft, any rocket, any guided or ballistic missile, any artificial satellite, any space vehicle, or any other vehicle made by man. As just one example, the attack carrier U.S.S. Forrestal is about five city blocks long. It has more than four acres of deck. It is about as high, from keel to the top of a mast, as a 25-story building. It displaces about 78,000 tons fully loaded. It took 52,500 tons of steel, 200,000 rivets and 2,400 miles of welding. Yet, it is a high-yield investment in national security. It is highly mobile, an "instant air base" almost anywhere we need one with a speed in excess of 30 knots. It can launch 32 planes in four minutes with no question of national sovereignty or land base rights.

Navy material requirements are unique. We must operate not only on and under the sea but also over the beach and in related land operations, and also in air and space.

Our business of support to the operating forces is big business. NMC spends between $10 and $11 billion per year which is about $20,000 every minute, around the clock, around the calendar. This is about two-thirds of the total Navy budget and about 12 percent of the total Federal budget. Out of every $100 paid in Federal taxes, $12 goes to NMC. The supply inventory for our forces is over $9 billion, while the inventory of real estate (four and one-half million acres) and property and facilities is about $33.6 billion.

The management information environment includes the Navy's setting in the framework of the Federal Government and the information requirements of the President, Bureau of the Budget, Defense Department, Secretary of the Navy and Executive Assistants, and other executive departments and agencies whose work affects the Navy including the Congress and the General Accounting Office. In addition state and local governments, trust territories and foreign countries have information requirements which must be met. A multitude of laws and regulations also generate information requirements. Management information systems must provide for these requirements.



RAdm. Thomas J. Rudden Jr., USN, is Deputy Chief of Naval Material (Programs and Financial Management). He has served with the Naval Material Command since 1964, first as Deputy Commander, Antisubmarine Warfare Systems Project. Later he was given responsibility for developing the organizational structure and concepts of operations of the Naval Ordnance Systems Command. He is a graduate of the U. S. Naval Academy, class of 1939.

The Management Organization and Philosophy.

The Chief of Naval Material (CNM) commands and manages six systems commands (Ships, Air, Supply, Facilities and Engineering, Ordnance, and Electronics) and managers of twelve projects, such as the Antisubmarine Warfare Systems Project and the Fleet Ballistic Missile System Project (Polaris and Poseidon) to mention two well known projects. Further, in this complex there are about 550 field activities (laboratories, shipyards, depots, etc.) and about 370,000 military and civilian personnel in the headquarters and in the field.

The systems commands have the technical and engineering expertise of the Navy. They provide the technical support to projects including some they have established which are of lesser scope than the CNM projects. A problem in this connection is to preserve these technical resources and not disperse them among project managers. It is necessary to strike the best balance between the needs of the project and the capabilities of the commands.

In a very real sense, NMC can be equated to a corporate complex. The six systems commands are the technical managers for the work for which they are responsible. Viewed in this manner, the CNM and his staff (NAVMAT) act as corporate headquarters and, as such, manages the managers. NAVMAT is a management and control organization. In this role it ties together the systems commands by:

- Allocating resources to them—resources management of manpower, real property, weapons, services, materials, supplies and funds.

- Assuring that planning and programming are applied comprehensively and cohesively.
- Setting goals and objectives for NMC as a whole.
- Standardizing and testing the adequacy of management systems.
- Assuring that contracting and procurement policies are developed and applied across the board.
- Insuring that development programs meet our needs.
- Striking the best balance between the needs of systems commands and project managers.
- Evaluating logistical programs and efforts.

In summary, the CNM controls the management operations which govern the technical functions. He does this, basically, by policy enunciation and enforcement, establishing defined centers of authority and responsibility, through planning, and by acquiring good information for decisions.

The NAVMAT headquarters management structure is lean with a staff of five deputy chiefs (Planning and Financial Management, Procurement, Development, Logistic Support, and Management and Organization). The management functions of planning, organizing, directing, controlling and coordinating are carried out in detail by these five deputies. Their titles are explanatory of their functions. They operate on the CNM management philosophy that the role of the top manager is to create an environment within which all subordinate levels of management can work most effectively—to leave lower-level matters at lower-level management. This "hands-off" management philosophy is also applied to the administration of many contracts with industry.

Our job as managers is to monitor contractor performance. We should not, and we will not, do the contractor's management job for him. At the same time, we must know, and we will know in detail and in real time, how his performance is meeting our requirements over the period of the contract.

We are convinced that, with this management philosophy, we will get better naval weapons and equipments on a more timely basis for less cost. We are convinced that this philosophy takes fuller advantage of the best features of the American system of free enterprise, that it stimulates greater competition, that it provides for better incentives, and that it shifts risks from the Navy to the contractor, as it should do.

NMC Management Information Systems.

Everything that a manager does ultimately comes down to decision making, and the science of management is the art of organizing facts for the decision-making process.

In the management business facts are like ammunition to the infantry and like gasoline to the aviator. Without facts operation is not possible and the organization and the assimilation of facts is the area where the good manager exercises his greatest artistry.

The major leap forward in management technology has been in the business of assembly and retrieval of facts. The old-time managers used to keep everything in their heads, but no more. The complexities of managing NMC requires formally organized management information systems, both automated and manual, which are geared to providing managers at all levels:

- Information that will help them assure that resources are obtained and used effectively and efficiently in the accomplishment of their objectives.
- Data to support program proposals and requests for funds.
- A means of assuring that statutes, agreements with Congressional committees, and other requirements originating outside the DOD relating to resources are complied with.
- Information that is necessary to formulate objectives and plans, monitor their execution, and isolate problem areas with a factual basis for corrective action. The law of the exception applies here, namely, concentrate on those areas and facets which are above or below planned performance.

NMC now has 200 automated data processing management information systems with 2,500 reports and a larger number of manual systems at headquarters to enable its managers at all levels to carry out their responsibilities. Data processing has been centralized at the headquarters level in the NMC Support Activity. There are 300 people in the Data Processing Group and 19 computers. An example of a management information system handled by this group is the MCON (Military Construction) System of the Naval Facilities Engineering Command. This system collects costs for new construction, reflects work in place, reflects real property inventory, and provides input into the Integrated Program Management System.

Development of formal data systems has been a slow and evolutionary process within the systems commands and project manager offices. Initially manual systems, supported by large clerical organizations, maintained the material and financial records required to operate our various organizations. Systems were developed in support of specific functions and operated at specific levels of management. The introduction of tabulating equipment and

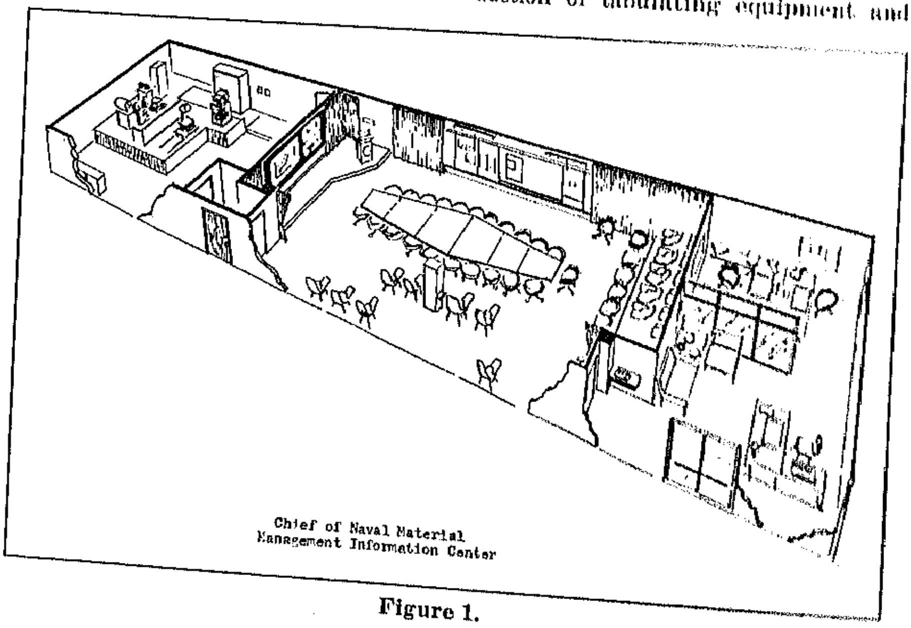


Figure 1.

the early use of computers reduced the clerical task and provided more information faster. The management process, however, required the reduction of voluminous reports to meaningful summaries for use in the decision-making process. Again, this was performed by manual clerical effort.

Within the last five years the introduction of more refined computer hardware and software has brought about data system development producing the entire span of management reports in support of a particular function. In some cases integrated data systems have been developed producing management reports for several functional areas and utilizing single point of entry (automatic feedback) of data from functional areas to centralized information processing. Specific examples are the Industrial Naval Air Station at Alameda and the Boston Naval Shipyard (developing Management Information System for Shipyards). The complexity of new weapon systems has generated the need for tremendous improvements in system techniques and ability to handle the increasing volume of associated data and management information.

The Department of the Navy's plan for introduction of automatic data processing equipment, as outlined initially in SECNAV Instruction P10-462.7 of April 16, 1959, has been closely followed in the mechanization of data systems within the NMC. Stage 5 (1960–65) of this plan called for

- The evaluation of our initial automatic data processing equipment installations; extension of early experience developed to all levels of activities.
- An awareness of the full potential of automatic data processing.
- A shift of application emphasis to the areas of planning, programming, scheduling, etc., in addition to the common uses stemming from reduction of clerical efforts.
- A shift in emphasis to more centrally developed programs in the design of more optimum management information systems utilizing operations research techniques.
- A maturity of hardware (third generation computers with improved input-output capabilities).
- The development of an overall Navy plan to bring about the complete transition of all resources to a full complement of information systems and hardware.
- Because of complexities in data and information systems design and the high costs involved, the NMC has not achieved all objectives of Stage 5 (1960–65). However, progress in both systems design and hardware installation indicates that complete achievement of Stage 5 objectives is feasible.

The requirements brought about by complexities of modern weapon systems have generated the need for a greater decision response capability at each management level. The ouputs of individual information systems developed by components of the NMC serve intermediate decision levels and culminate in management-by-exception reporting conducted through a complex of management centers. The CNM reviews the effectiveness of the NMC (on a weekly basis) at the CNM Management Information Center (MIC) through information provided manually by the complex of centers supporting each major management level. Similarly, the commands and project managers review the effectiveness of their programs in management information centers and, in addition, screen written reports, correspondence and other information flows.

The Management Information Center.

The information system currently supporting the CNM is determined by requirements generated for the weekly meetings in the CNM MIC. These meetings are chaired by the CNM and attended by the senior representatives of the first echelon line components of NMC. The Special Assistant to the Secretary of the Navy and/or a representative of the Office of Management Information are also in attendance. The format of these meetings cycles a status report from each of the major first echelon line components each month. In addition, the Management Information Division provides a series of key indicators on the overall status of the NMC to alert the CNM to possible danger signs. The information base that supports the center is built on existing information sources of the project managers and commands. Some of this information comes from mechanized systems but the majority is the result of manual efforts.

The MIC itself has a capability for viewgraph and slide projection, 16mm movies, conventional or closed circuit TV reception, conventional charts displayed on sliding panels or in permanent position and a large magnetic map for world-wide location of NMC interests. The slide capability provides for random access of 660 displays. Figure 1 shows the NMC MIC.

At the MIC the goal is "instant" management information. No matter what questions arise, or what information is needed, there is usually enough expertise and enough experience on hand to answer questions or provide information on the spot. There is no delay in the decision-making process while research is done, facts and figures checked, etc. There is an instant exchange of management ideas and instant consideration of multiples and complex interfaces among and between the headquarters of the NMC, systems commanders and project managers involving overlaps, non-contacts, conflicting requirements or priorities, etc. Instant management decision making is based on sound information and good communication with all pertinent factors considered. There are no study groups, lengthy exchange of memoranda or buck-passing. There is no procrastination. Everyone knows exactly who is in charge, who has principal action, collateral actions, when, where, why, how, etc. People in specialized areas get exposed to the "big picture" and how they fit in at these meetings. If our new A–7A aircraft requires something special in the way of facilities construction or equipment, the responsible people know about it immediately. There are no "surprises," and there is better integration and better coordination. The CNM management problem is a totally interrelated and interdependent end product, namely, the material support of the operating forces.

Specific guidance has been provided to those who present management reports to the CNM in NAVMAT Notice 5050 of April 1, 1966 as follows:

- Management reports made to the CNM should address any activity, event, or condition which has the potential or has already increased total program cost, delayed operational availability, delayed significant milestones, or degraded performance.
- Clearly defined plans, schedules and objectives should be the basis for portraying progress, for evaluation

of accomplishment, and for uncovering current or potential problems.

• In portraying information, the principle of management by exception should be followed. Unnecessary detail (clutter) should be avoided by the use of summary information whenever it accurately reflects the detailed facts.

• Where comprehensive coverage is being offered or required, selected visual aids should provide a means of addressing each of the basic management variables, i.e., performance, cost and schedule.

• Originals or reproductions of graphic aids of subordinate management information center or focal points are encouraged for use in the CNM MIC to the maximum extent.

• Each systems commander, deputy chief of naval material and project manager should continue to strive for consistency in information presented and uniformity of methods and techniques of presentations.

• Basic to the whole concept of performance presentation and appraisal during management reports is the continuing comparison of actual performance with the relevant plan, schedule, or objective.

Many of the reports made in the NMC MIC are repeated in the Secretary of the Navy's MIC and the Chief of Naval Operations MIC. The decision as to which reports should be presented are made during the Wednesday meeting of the CNM MIC.

The CNM has an established schedule of management information meetings. He has a daily staff meeting, except Wednesday, with his deputy chiefs who report briefly on major problems and significant upcoming actions. Guidance is given by the CNM with particular emphasis on actions expected that day. Each Friday, the CNM holds a meeting with the System Commanders Policy Council, a separate meeting with the Project Managers Policy Council and usually with the Secretary of the Navy. In addition, he meets frequently with the Deputy Chief of Naval Operations for Logistics when they iron out problems between the user and producer sides of the Navy's house.

Frequent meetings with industry round out the management information available to the CNM. The partnership with industry is indispensable to accomplishing the NMC mission of material support to the operating forces.

Management Information Systems Plans

We cannot stand still in this field of management information. We must continue to press the state of the art in management information systems sciences. An Information Sciences and Plans Branch has been established in the Management Information Division of NAVMAT for this purpose and is developing an Advanced Management Information System. Most management data systems operate at the hardware store level. Few, if any, function effectively at the level of strategic management decision making. We are trying to build a top level management information system. Among its techniques will be simulation of alternatives, modeling and decision logic. If we are successful, we can forecast our problems. We can see them coming before they are on top of us. Possibly we should call this an "Early Warning and Calamity Avoidance" System.

There is a specific need to support the CNM and his deputies with an Advanced Management Information System. This need was supported by the findings of a study performed under contract for the CNM. The contractor's findings concluded that improvement was necessary and possible, and stated these principles and system characteristics for further development:

• The system must first satisfy requirements for information essential to the accomplishment of the mission of the CNM.

• It must be primarily responsive to the management information requirements of the CNM and his senior staff.

• It must support the task of control, i.e., the management functions of monitoring, evaluating, reporting, coordinating, establishing policy, guiding and directing.

• It should not duplicate other NMC systems.

• It will, therefore, generally be concerned with selected summary information produced to a large degree by the operating systems of lower echelons.

Further, it is the intent that any advanced system developed will support the CNM MIC in a "right time" play capability. It is further intended that any system developed will mutually support the facilities operating components of NMC and be compatible with their internal management information system.

The Management Information Division is responsible for directing and coordinating the development and implementation of an integrated management information system and services for NMC. In performing these responsibilities the division operates with the designated functional management (information systems) coordinators in NAVMAT, the management information coordinators in each of the NMC [illegible] and the project managers offices and, through the commands, with NMC field activities. The division director is the single point of contact within NMC for automatic data processing policy.

In accordance with the responsibility and the supporting goals of the Management Information Division, a management information system concept has been developed which has the following features:

• Systems will be designed to support the Navy Resources Planning and Control System and the management systems of each component of NMC. The information systems will be designed to fit into their place in the total concept [illegible]

• [illegible] NAVMAT, project managers [illegible] and field activities. Separate information [illegible] associated with each echelon [illegible] input data, records and files, and output reports are contained in the structure. The data and information [illegible]

(Continued on Page [illegible])

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Government Printing Office Publications

U.S. Government Printing Office
Washington, D.C. 20402

Research Reports

Authorized DOD contractors and grantees may obtain these documents without charge from:

Defense Documentation Center
Cameron Station
Alexandria, Va. 22314

Others may purchase these documents at the price indicated from:

Clearinghouse for Federal and Scientific Information
Department of Commerce
Springfield, Va. 22151

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MILSTRIP, MILitary STandard Requisitioning and Issue Procedures, Change 13, Aug. 1, 1966. Contains changes to MILSTRIP. 1966, 172 p. Catalog No. D 7.6/4:M 59/ch.13. $1.25.

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Research on Exhaust Gas Effects on Heat Exchangers. United Aircraft Corp., for the Air Force, July 1966, 144 p. Order No. AD-637 952. $4.

Reorganization Effected at APGC

The Air Proving Ground Center (APGC), Eglin AFB, Fla., has shuffled its organizational structure to enable the center to more effectively and efficiently accomplish its assigned mission.

All APGC test management activities have been consolidated under the Deputy for Test, Col. R. L. Blachly. The Deputy for Test has been formally termed the Deputy for Test Operations.

In addition, the former Deputy for Effectiveness Test organization has become the Air Force Weapons Effectiveness Test (AFWET) Directorate assigned to the Deputy for Test Operations.

The AFWET Directorate, headed by Col. R. R. Moulton, conducts predictive analysis, designs tests, provides technical supervision of test conduct, analyzes the resultant data and reports on AFWET programs. The physical tests are carried out and supported by other Deputy for Test Operations directorates—the Electronics Test, Munitions Test, Aircraft and Missile Test, and the Test Operations Directorates.

APGC is responsible for Air Force weapons effectiveness testing, electronic warfare testing, non-nuclear munitions testing, and vertical probe operations.

Management Information Systems
(Continued from Page 14)

mation contained in each of these reflect three or more basic levels of summarization: total program status at the highest summary level; status of each major program at the highest summary level; status of each major supporting task at the highest summary level; etc., to the lowest common denominator of the work breakdown of the program which the management system provides.

The Management Information Systems Plan is the framework for directing and coordinating the information systems development program. It will also be the five-year systems improvement plan for NMC. Systems improvements by components of the NMC will be coordinated by the Management Information Division to ensure consolidation of an integrated data base to support the overall objective and the information and reporting requirements of the CNM. The 1967 Management Information Systems Plan (FY 1968) will be the second cycle of planning and stating information requirements. These stated requirements become the foundation and authority for automotive data processing equipment, program change proposals, and funds in the budget to implement new systems.

The Management Information Division, through use of the annual Management Information Systems Plan and an improved inventory of data systems, subsystems, and systems components, will guide the evolution of new systems within the components of NMC in order to provide for the most optimum balance between information to support each management level and costs associated with such systems.

The full benefits of the NMC reorganization of May 1, 1966, have not yet been realized nor have all the basic management philosophies been fulfilled. However, the goals and concepts have been formed and steady progress has been made. The needs of our operating forces shall be met!

U.S. Air Force System Program Directors and Project Officers

Addresses for officers listed below are:

ASD: Aeronautical Systems Division
Air Force Systems Command
Wright-Patterson AFB, Ohio 45433
Phone: (513) 253-7111

BSD: Ballistic Systems Division
Air Force Systems Command
Norton AFB, Calif. 92409
Phone: (714) 382-4207

ESD: Electronic Systems Division
Air Force Systems Command
L. G. Hanscom Field, Mass. 01731
Phone: (617) 274-6100

SSD: Space Systems Division
Air Force System Command
Air Force Unit Post Office
Los Angeles, Calif. 90045
Phone: 643 plus extension

AERONAUTICAL PROGRAMS

Program No.	and Title	System Program Director and/or Project Officer
129A	FB-111	Maj. Gen. J. L. Zoeckler ASD Ext. 53258
140A	AGM-69A (SRAM)	Col. Joseph Green ASD Ext. 55811
226A	AIM 7 D, E (Sparrow)	Mr. M. B. Rutstein ASD Ext. 55281
311A	AGM-12C (Bullpup B)	Lt. Col. William Monday ASD Ext. 52115
313A	AGM-45A (Shrike)	Lt. Col. William Monday ASD Ext. 52115
314A	AGM-62A (Walleye)	Lt. Col. William Monday ASD Ext. 52115
319A	AGM-65A (Maverick)	Lt. Col. Ward E. Protsman ASD Ext. 54568
321A	AGM-12B (Bullpup A)	Lt. Col. William Monday ASD Ext. 52115
324A/B	F/RF-111A (TFX)	Maj. Gen. J. L. Zoeckler ASD Ext. 53258
324K	F-111K	Maj. Gen. J. L. Zoeckler ASD Ext. 53258
326A/ 327A	F-4C RF-4C	Col. Charles Clemence ASD Ext. 64657
337A	A-7	Col. J. D. Hails ASD Ext. 67809
400H/K	HC-130H/ C-130K	Mr. Ray Carlson ASD Ext. 54010
410A	C-5A	Col. G. M. Townsend ASD Ext. 54301
420A/B	F-5A/B	Col. Mark Treat ASD Ext. 53356
443Q	UH-1F (AF)	(Vacant) ASD Ext. 55323
463L	Materials Handling	Col. D. W. Ewing ASD Ext. 52793
476L	C-141	Col. D. W. Ewing ASD Ext. 52793
482A	HH-53B	Lt. Col. F. L. Mosher ASD Ext. 52793
485B	CH-3C/HH-3E	Lt. Col. F. L. Mosher ASD Ext. 58480

Program No.	and Title	System Program Director and/or Project Officer

BALLISTIC PROGRAMS

133A/B	Minuteman	Brig. Gen. A. W. Cruikshank BSD Ext. 6014
627A	ABRES	Brig. Gen. Kenneth W. Shultz BSD Ext. 7068

ELECTRONIC PROGRAMS

407L	Tactical Air Control System	Col. Spencer Hunn ESD Ext. 75–4954
416M	BUIC	Col. F. L. Ayres ESD Ext. 4101
418L	Ryukyu Air Defense System	Col. F. L. Ayres ESD Ext. 4101
433L	Weather Obs & Forecast	Lt. Col. Robert L. Houghton ESD Ext. 78–640
436L	North Atlantic Comm System	Lt. Col. Joe Maher ESD 78–680
439L	Sea Coastal Cable System (Seedtree)	Col. G. B. Hilton ESD Ext. 78–680
440L	Scatter OTH Radar	Col. Herbert Dotson ESD Ext. 2817
441A	AN/FPS 95 Radar	Col. Herbert Dotson ESD Ext. 2817
458L	European WB Transmission Media Improvement Program	Col. G. B. Hilton ESD Ext. 78–680
473L	HQ USAF Command and Control System	Col. R. L. Edge ESD Ext. 5354
474L	BMEWS	Col. Tom O. Wear ESD Ext. 2678
474N	SLBM	Col. Tom O. Wear ESD Ext. 2678
481A	Airborne Data Automation	Lt. Col. Barker ESD Ext. 85–4727
482L	Emergency Mission Support	Col. Spencer Hunn ESD MITRE Ext. 4954/4955
484L	Soft Talk	Col. R. L. Bell ESD Ext. 78–640
484N	Pacific Area Communications System	Col. G. B. Hilton ESD Ext. 78–680
486L	Mediterranean Communication System	Col. G. B. Hilton ESD Ext. 78–680
487L	Survivable Low Frequency Communications	Col. J. T. Tyler ESD Ext. 78–783/4/5
489L	Northern Area Communications	Col. G. B. Hilton ESD Ext. 78–680
490L	DCS Automatic Switch Voice	Col. G. B. Hilton ESD Ext. 78–680
491L	AUTOSEVOCOM	Col. R. L. Bell ESD Ext. 78–640
492L	US STRICOM Command & Control System	Col. D. W. Bowry ESD Ext. 5337
493L	Secure Voice SW Network	Col. R. L. Bell ESD Ext. 78–640
494L	ERCS	Col. J. T. Tyler ESD Ext. 78–783
495L	USAF G/A Program	Col. R. L. Bell ESD Ext. 78–640
496L	Space Track	Col. Tom O. Wear ESD Ext. 2678
	FRELOC-FASTRACE	Mr. George Moulton ESD Ext. 78–670
497L		Col. R. L. Bell ESD Ext. 78–640
499L	AIMS	Col. L. G. Blais ASD Ext. 54804

RECONNAISSANCE PROGRAMS

119N	RC–135A	Maj. Luther Jones ASD Ext. 52352

	Program No. and Title	System Program Director and/or Project Officer
119P	RC-135C	Lt. Col. Clyde Bensey ASD Ext. 53053
428A	TIPI	Col. R. R. Frederick ASD Ext. 55116
466L	ELCO	Col. H. F. Dotson, Jr. ESD Ext. 2817

SPACE PROGRAMS

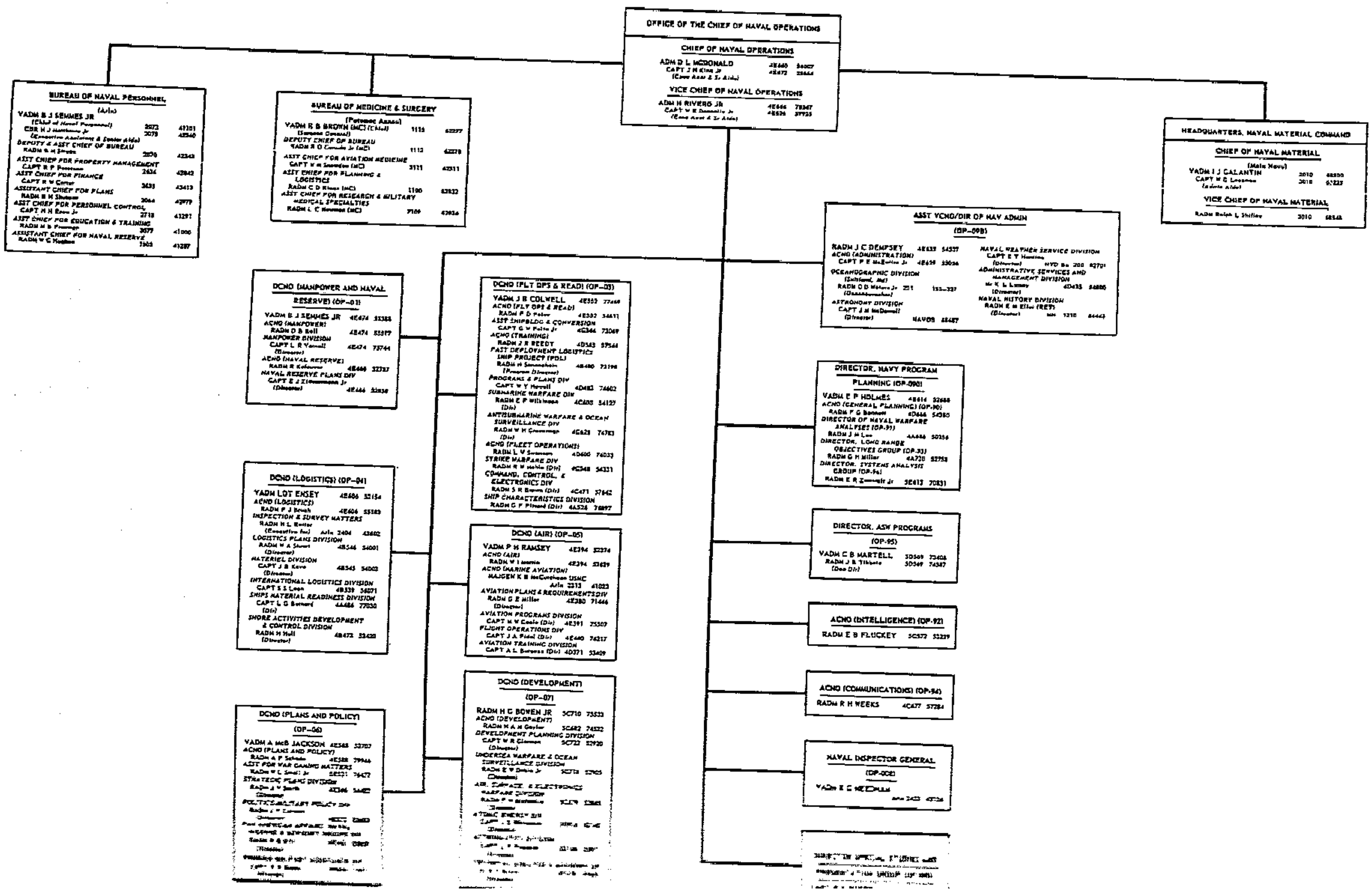
623A	Large Solid Propellant Motors	Col. Norman Keefer SSD Ext. 31106
624A	Titan III Space Booster	Col. W. R. Taliaferro SSD Ext. 30734

OTHER PROGRAMS

101A	B-52	Lt. Col. E. W. Geniesse ASD Ext. 55654
102A	B-58	Lt. Col. E. W. Geniesse ASD Ext. 55654
107C	Titan II	Col. Quentin J. Goss BSD Ext. 6804
110A	XB-70	Mr. John P. McCollom ASD Ext. 52230
131C	AGM-28/ TERCOM	Maj. W. S. Paul ASD Ext. 53504
201W	F-106 MOD 10001 (MA-I AWCIS Solid State Computer)	Mr. Dale Little ASD Ext. 54247
202A	ASG-18/ AIM-47A	Col. B. N. Bellis ASD Ext. 54734
208A	AIM 4B, C, D (Falcon)	Mr. E. C. Rado ASD Ext. 53800
221A	AIM 9B, D (Sidewinder)	Mr. M. B. Rutstein ASD Ext. 54556
303G	F-104G (MAP)	Maj. D. S. Kromer ASD Ext. 52326
306A	F-105D/F	Lt. Col. F. L. Cunha ASD Ext. 55237

	Program No. and Title	System Program Dire and/or Project Offic
332A	AGM-76A	Col. B. N. Bellis ASD Ext. 54734
334A	YF-12	Col. B. N. Bellis ASD Ext. 54734
420L	T-38	Col. Mark Treat ASD Ext. 53356
424L	T-37B/C	Lt. Danny R. Preble ASD Ext. 55068
429L	BQM-34A	Mr. Ray Dearbaugh ASD Ext. 34800
430A	Interim TIPI	Maj. J. W. St. John ASD Ext. 53324
478A	VTOL Util Trans (XC-142)	Lt. Col. William Carr ASD Ext. 53641
479A	Nike-Zeus Target	Col. J. A. Urban BSD Ext. 4029
628A	Agena D	Lt. Col. Cecil E. Riddle SSD Ext. 643-2228
629A	Standard Atlas	Col. Leo W. Sullivan SSD Ext. 643-1032
631B	Gemini (GLV)	Col. Robert R. Hull SSD Ext. 643-0366
632A	MOL	Col. William Brady SSD Ext. 643-0900
653A	X-15	Mr. Robert Clodfelter ASD Ext. 53805
680A	START	Col. Curtis L. Scoville SSD Ext. 32822
683A	Vela Satellite	Col. S. H. Sherrill SSD Ext. 643-3184
	SR71	Col. B. N. Bellis ASD Ext. 54734
	Scout	Lt. Col. Joe D. Johnston SSD Ext. 643-0024

ORGANIZATION CHART
OFFICE OF THE CHIEF OF NAVAL OPERATIONS



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MARCH 1967

SPEAKERS CALENDAR

DEPARTMENT OF THE ARMY

Lt. Gen. William F. Cassidy, Chief of Engineers, at Annual Meeting of Philadelphia Post, Society of American Military Engineers, Philadelphia, Pa., Jan. 25.

Brig. Gen. Harry G. Woodbury, Dep. Dir., Civil Works, Office of the Chief of Engineers, at Nebraska Watershed Workshop, University of Nebraska, Lincoln, Neb., Jan. 25.

Gen. Harold K. Johnson, Chief of Staff, at University of Arkansas ROTC Commissioning Exercise, Fayetteville, Ark., Jan. 29.

DEPARTMENT OF THE NAVY

Capt. L. B. Melson, Asst. Chief for Research, Office of Naval Research, at Naval Academy Assn. Meeting, New York, N.Y., Feb. 21.

Adm. David L. McDonald, Chief of Naval Operations, at Naval Academy Assn. Meeting, New York, N.Y., March 17.

DEPARTMENT OF THE AIR FORCE

Brig. Gen. J. S. Bleymaier, Commander, Air Force Western Test Range, at University of Southern California, Los Angeles, Calif., Jan. 27; at R. M. Greene & Associates, Los Angeles, Calif., Feb. 5; at American Society for Quality Control Meeting, Vandenberg AFB, Calif., April 27.

Gen. J. P. McConnell, Chief of Staff, at 25th Anniversary of Griffiss AFB, N.Y., Feb. 1; at Air Force Ball, New York, N.Y., Feb. 21; at Air Force Assn. Meeting, San Francisco, Calif., March 15-17; at 25th Anniversary of Tinker AFB, Okla., April 28.

Brig. Gen. P. R. Stoney, Vice Commander, Air Force Communications Service, at Armed Forces Communications and Electronic Assn. Meeting, Feb. 3; at Collins Radio Technical Assn. Meeting, Cedar Rapids, Iowa April 11; at Armed Forces Communications and Electronic Assn. Meeting, Maxwell AFB, Ala., April 18.

Hon. Harold Brown, Secretary of the Air Force, at Air Force Ball, New York, NY., Feb. 21; Air Force Assn. Meeting, San Francisco, Calif., March 15-17.

Lt. Gen. R. L. Bohannon, Surgeon General of the Air Force, at Air Force Ball, New York, N.Y., Feb. 21.

Maj. Gen. R. W. Manss, Judge Advocate General, at Student Bar Assn. Meeting, St. Louis, Mo., Feb. 23.

Gen. B. K. Holloway, Vice Chief of Staff, at Society of USAF Flight Surgeons Meeting, Washington, D.C., April 13.

Lt. Gen. T. P. Gerrity, Dep. Chief of Staff, Systems & Logistics, at National Society of American Value Engineers Meeting, Chicago, Ill., April 25.

Contracts Awarded by Air Force for VTOL Flight Control System

The Air Force has awarded contracts totaling more than $6 million to North American Aviation, Inc., Los Angeles, Calif., and Lockheed-Georgia Co., Marietta, Ga., as part of an overall vertical takeoff and landing (VTOL) integrated flight control program designed to advance technology in Air Force VTOL aircraft development.

The contracts were awarded by the Air Force Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio, a unit of the Air Force Systems Command's Research and Technology Division.

North American Aviation was awarded $5,671,000 in a contract calling for the development and demonstration of a VTOL integrated flight system. Work covered in the contract, to be performed over a 39-month period, includes advanced development of a total integrated flight control technology, including equipment, and the conducting of flight tests necessary to verify the technology.

A letter contract for $975,000 was awarded to Lockheed-Georgia for modifications of the XV-4A "Hummingbird" VTOL aircraft to a new type system with direct lift and diverted thrust jet engines. The aircraft will be redesignated the XV-4B.

Work on the XV-4 modification project is scheduled to begin immediately with the first flight of the aircraft set for late 1967. After a five-month test program by Lockheed and acceptance by the Air Force, the aircraft will be delivered to North American for employment in an intensive research and development program to develop and demonstrate handling qualities and control design criteria for VTOL aircraft.

The VTOL flight control program, including extensive simulation and flight tests by the Flight Dynamics Laboratory, is a link in the research and development program aimed toward eventual deployment of VTOL and V/STOL (Vertical and Short Takeoff and Landing) aircraft.

The program is under the direction of the Flight Dynamics Laboratory's V/TOL Technology Division, and is headed by Richard E. Colclough, Deputy for Development and Integration.

Air Force Increases Reserve AME Units

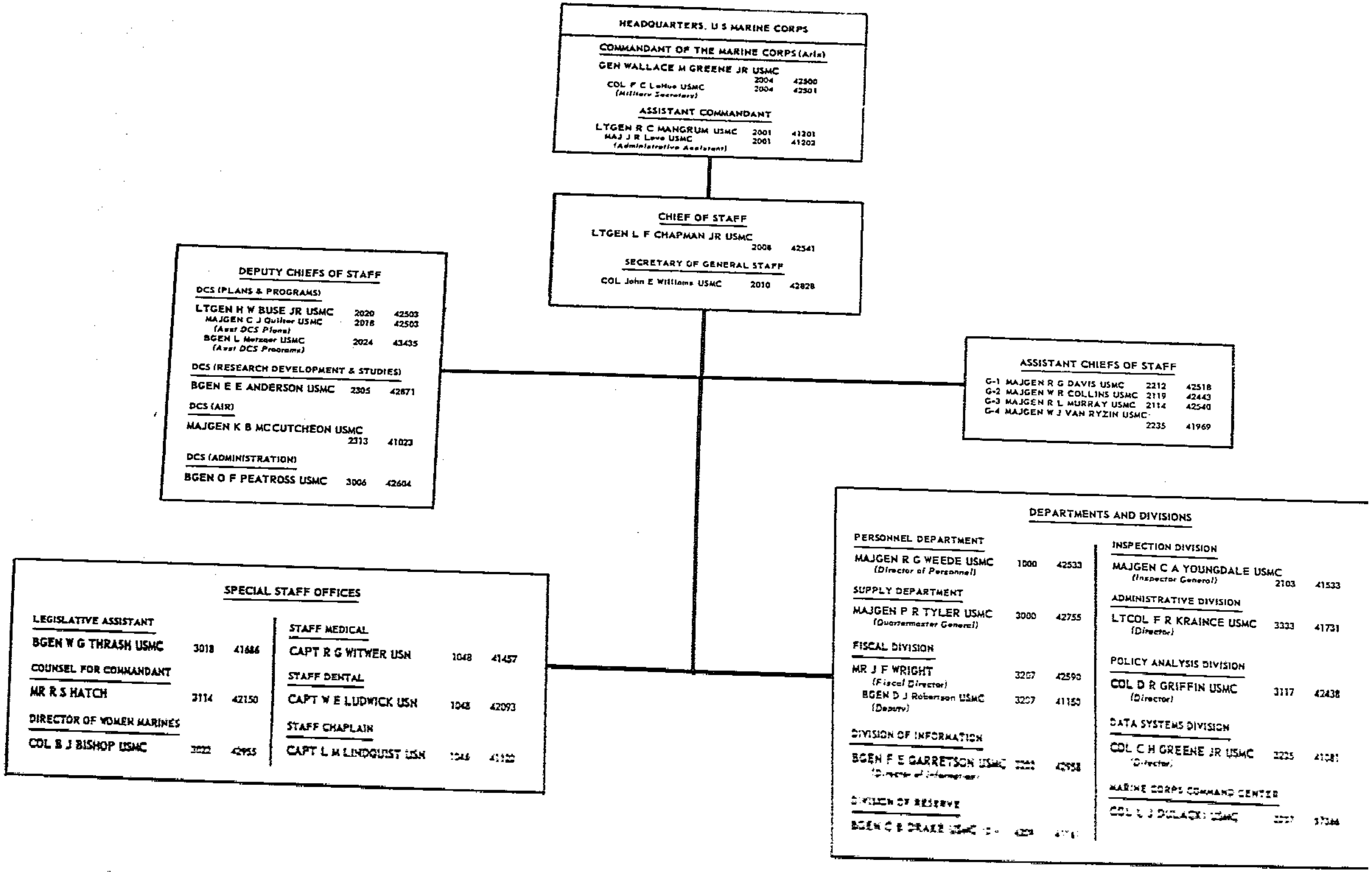
The Continental Air Command (CAC) has announced an increase of Air Force Reserve Aeromedical Evacuation (AME) units from 11 to 24 effective Jan. 1, 1967.

The increase is part of a major reorganization of the Air Force Reserve AME structure which involves the activation of 15 flights and the inactivation of three groups and two squadrons; nine other existing units will be reorganized. All 24 AME units will be assigned to Air Force Reserve Military Airlift Groups, and most will be collocated with their parent group.

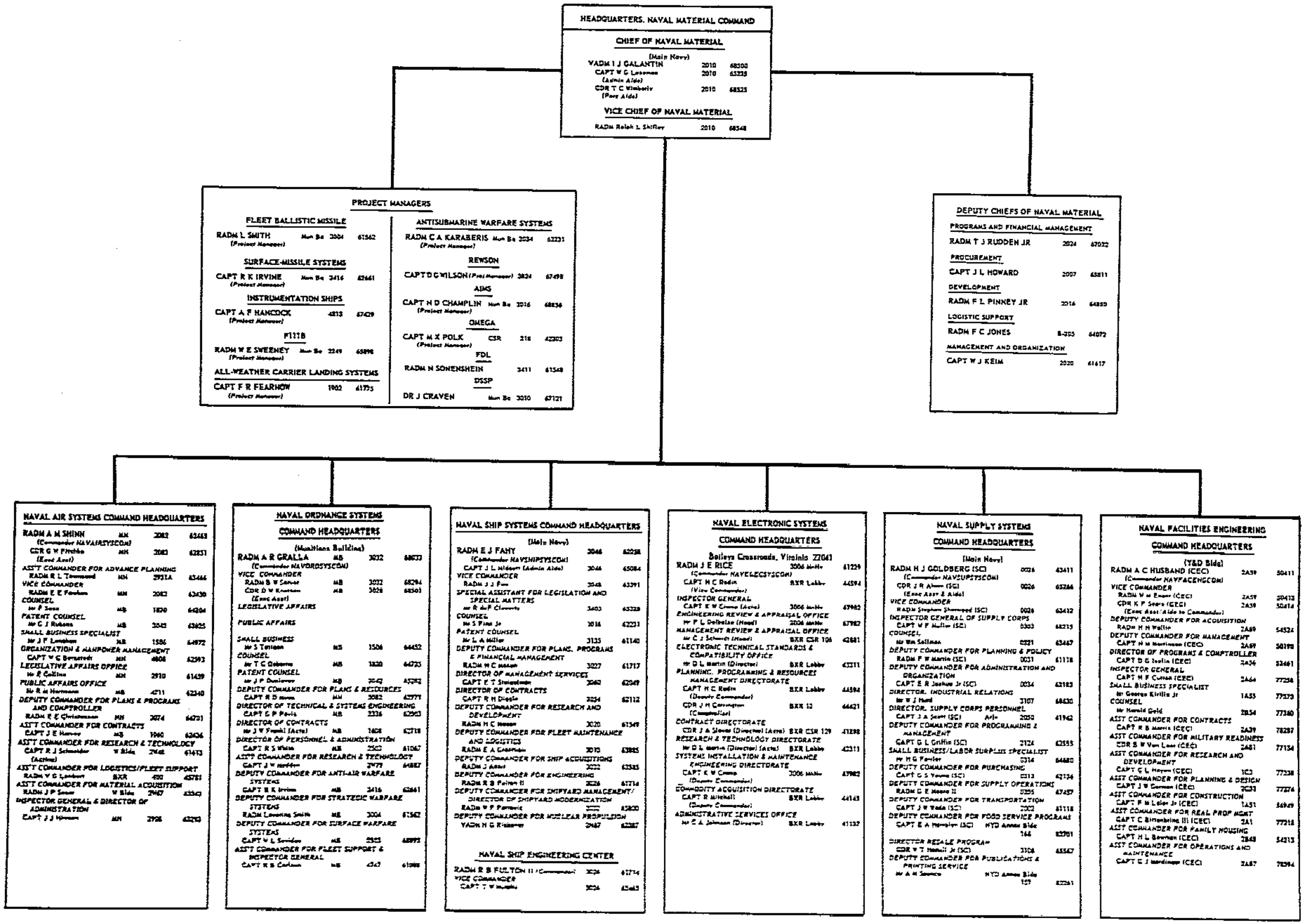
Reorganization will provide the Military Airlift Command (MAC) with an expanded capability to perform its world-wide aeromedical evacuation of the ill and wounded through selective callup of trained Air Force Reserve AME units.

In peacetime, Air Force Reserve AME units will train on regular MAC routes. The forthcoming increase in Air Force Reserve AME locations will expand CAC's capability to provide the Reserve portion of the total MAC requirement in the event of a prolonged national emergency.

ORGANIZATION CHART
HEADQUARTERS, U.S. MARINE CORPS



ORGANIZATION CHART
HEADQUARTERS, NAVAL MATERIAL COMMAND MATERIEL COMMAND



FROM THE SPEAKERS ROSTRUM

Address by Maj. Gen. Walter E. Lotz Jr., Chief of Communications-Electronics, Office of the Chief of Staff, U. S. Army, to the Washington Chapter, Armed Forces Communications and Electronics Assn., Washington, D.C., Dec. 1, 1966.

Maj. Gen. Walter E. Lotz Jr., USA

COMMUNICATIONS IN A COUNTERINSURGENCY ENVIRONMENT

I have been on the job here for 90 days and I can state that the Army's communications-electronics challenge and potential from a soldier's, engineer's, scientist's, or industrialist's viewpoint have never been greater.

The tremendous awareness and interest of the role and significance of communications-electronics on the part of the Chief of Staff and the Secretary of the Army, and their personal support, make it eminently clear that I have a real job ahead of me to live up to their demands and expectations. In this regard, both the Army and myself will need your continuing help and support.

It is inevitable that people returning from Vietnam appear to be preoccupied with, if not just plain insistent on, talking about the situation there and how it affected their jobs. Brace yourselves because I am no exception. I will describe the communications situation in Vietnam both from the context of the unique characteristics of operations and communications, and from what we might do to better prepare for counterinsurgency in other underdeveloped countries.

It is painful to admit, but let us face it, too often our communications concepts, doctrine, and even systems, have a way of reflecting the situation which occurred in the last previous major conflict or war. When you couple this normal bias with the long lead-time for development of requirements, the conduct of research and development, and the acquisition and installation of communications-electronics hardware in the field, it is apparent why we have so much "undoing" to go through as well as "doing."

Some of our most cherished ideas and concepts of communications-electronics were jolted in Vietnam.

One of these was our well established concept of differentiating between strategic and tactical communications; another was the viewpoint that each of our Military Services had to own or have organic to their command the communications which served their command and control, operational, and supporting activities. Finally, the view that the military communicator would fulfill only the military needs, and somebody else would look after the communications needs of the civilian government, commercial and industrial organizations, the population, and the press was destroyed. I might add here, as a sidelight, that experience in South America jibes with these lessons learned in Vietnam.

War in Vietnam is being fought, as most counterinsurgency actions are today, in a truly underdeveloped country. From the communicators' viewpoint, there are no developed telecommunications or telephone systems of the type to which we are accustomed serving governmental and commercial needs. Little use is made of cable and wire, outside of the populated and protected areas, because wire lines and cables can be—and have been—cut by the guerrilla forces. In the war in Europe, and even in Korea, our military forces were able to reconstruct and utilize buried cables along with other remnants of the communications infrastructure. This is not possible in Vietnam. In Vietnam, the U. S. military has had to build a main-line telephone and telegraph trunking system with local distribution, virtually from scratch.

In the conventional concept of military communications, we visualize a front of operations with communication circuits radiating from headquarters, bases and depots in secure rear areas to combat units on the front lines.

In this concept, headquarters displace to maintain control of the combat elements as the tide of war progresses. In ground combat operations in the Republic of Vietnam there is no classical front or rear, nor any totally secure area. Combat is conducted from time to time in all parts of the country. There are no sanctuaries free from the activities of the Viet Cong and no communication installation is free from the threat of attack. Nor in this war do we see the displacement of major headquarters. Large headquarters, airfields, supply depots and base camps of major units remain in fixed localities. Thus the long-haul communications system linking the major terminal points is geographically fixed; it remains static and need not have the capability of moving periodically. From time to time, brigades, battalions and smaller units move out from their base camps to conduct search-and-destroy missions. To accommodate this, the fixed communications system is extended by mobile tactical equipment, which provide what are called "tactical tails," connecting the combat units to the fixed communication system.

The fixed long-haul communications network in Southeast Asia including Thailand, designated the Integrated Wideband Communications System

(IWCS), is a distinct departure from conventional communications systems. Let us examine why.

First, while the U. S. ground combat troop complement in Vietnam corresponds generally to a field army, this army is dispersed over a territory 700 miles long and varying in width from 40 to 100 miles. Conventional military planning provides a field army communications system that covers an area about 200 by 180 miles.

Second, in conventional military planning, we visualize a strategic communications system which extends our world-wide communications into combat theaters as far forward as the headquarters of field armies. In Vietnam, the IWCS, which is integrated with the world-wide system, extends to divisions, brigades and even smaller units. Therefore, it is both strategic and tactical. The significance of this point is more than just conceptual. Our strategic communications equipments are engineered to fixed plant commercial standards, while our tactical systems have been designed around engineering parameters which are most convenient for employing highly mobile equipments providing relatively few circuits per path.

In the conventional system we can interface the strategic and tactical systems at a single entry point at the headquarters of a field army and can, therefore, tolerate the introduction of interface equipment so that the strategic system will play successfully with the tactical system.

In Vietnam, we can identify some 75 interface points between the IWCS and tactical systems. At each of these points, we must have equipment to test and interconnect circuits and channels which have several multiplexing systems, modes of teleprinter operation, and transmission levels.

The IWCS is the primary, point-to-point, communications system meeting the requirements of all Military Services except, of course, for the organic tactical communications of divisions when they are deployed from their base camps.

Furthermore, the IWCS must provide communications for the American Embassy, the U. S. Agency for International Development, and the U. S. Information Agency in prosecuting their important programs for assisting the Vietnamese government in economic and social improvement.

In addition, the government of South Vietnam must look largely to the U. S. forces for dedicated circuits for air traffic control, public safety, radio broadcasting, railroad operations and many similar activities and for common-user, long-lines telephone service. You can see, then, that the IWCS is a combination of a military command control system and an AT&T long-lines system for South Vietnam. In view of this, I am sure that you can imagine the wide variety of terminal equipments which are interconnected by this system.

This military-established, long lines system is significant in size and is still growing. The backbone, or primary trunking links, handle as many as 240 voice channels. The total number of terminal-to-terminal circuits in the IWCS will eventually exceed 6,000.

The establishment of such a system requires more than engineering, procurement and installation. Almost all the circuit paths traverse enemy-controlled territory. Relay sites and interconnect points located outside of secure base areas must first be organized and equipped for defense against attack and sabotage. This has dictated that high-capacity, troposcatter systems must be the primary equipment in the backbone network. As a consequence, we have quickly and with great effort and expense put into being a highly sophisticated system of troposcatter and microwave equipment that is demanding upon our resources of skilled operator and maintenance personnel.

This cost is necessary if we are to provide the communication support needed by us, the Vietnamese and other Free World forces in prosecuting the war.

Although Vietnam today is demanding most of our attention and resources, we must remember it is only part of the struggle being conducted by the United States and the free nations against the world communist movement. Social unrest and insurgency exist in many underdeveloped and emerging nations of the world. Low level insurgency, that is, insurgency not involving large scale military engagements, occurred in Vietnam during the 1954 to 1963 time frame. It exists in other countries today, and could further materialize at various levels of intensity in still other countries.

The fundamental aim of the insurgents is to overthrow the existi government. Their means of doing t is to disrupt the conduct of gover ment programs, such as educatio law and order, industry, commerc and economic and social developmen They accomplish this through propa ganda, demonstrations, riots, sabotag terrorism and outright atrocities. Fo example, they murder public officia and commit atrocities against thei families, thus making it difficult t recruit responsible and qualified ad ministrators. They bomb restaurants thereby spreading the police force ou to reach and protect all public places They destroy bridges, thereby tying down the armed forces to protect all other vulnerable points on roads and railways. They levy taxes and collect them by violence, if necessary on farmers, merchants and fishermen to finance their operations.

The police, paramilitary and military counterinsurgency forces are continually in a defensive posture in reacting to insurgent incidents. The times and places of these incidents are at the choosing of the insurgents. The insurgents have the initiative. They usually concentrate on rural areas where law and order is the slowest and least effective, primarily because of deficiencies in transportation and communication. The counterinsurgency elements must have good intelligence, rapid warning of incidents, and the ability to mobilize and dispatch the required amount of force to the right place. This requires that the nation be literally covered with a comprehensive and reliable communications system to insure quick reaction to the insurgent forces.

It is interesting to note that insurgency is more successful in those countries which do not have a well developed communications system either government or commercial.

To provide such a communications system in Vietnam and other similar countries, a highly organized radio system consisting of nets by political and geographical boundaries is extended down to each village, hamlet and military outpost. The equipment at the village or hamlet level is battery operated since electrical power is highly unreliable, if available at all. The system, of course, must be capable of being operated, particularly at the lower levels, by unskilled civilians. This dictates a system that must be

both simple and portable, using entirely voice operation.

In counterinsurgency operations, :his village and hamlet radio network nay or may not be the responsibility of military forces.

Some of you may be familiar with :he networks in Vietnam. If so, you know that our U. S. Agency for nternational Development, and not he Defense Department, provides this ystem. You may also know that this .etwork is neither operated nor mainained by the Armed Forces.

Here is an area where the potenial of our great American electronic echnology has not yet been brought) bear fully on the problem. More ffective and more adequate radio sets an be designed and produced in large uantities to assist in the underdeeloped countries. I throw this probm to you as a specific challenge.

Next, insurgency thrives best within e rural localities where the citizen out of contact with his government. fact, in Vietnam—until recent ars—the average rice farmer and herman were not too keenly aware , or interested in, the central govnment. Newspapers, motion pictures d radio broadcasts were not a sigficant part of their lives. They were most out of touch with the governnt. We, in fully developed demoatic nations, know well that the reonsiveness of the government to the eds of the populace depends upon ive participation in the governnt's processes. This requires mass nmunications media from the govment to the people. In Vietnam lio broadcasting, newspapers, leafs and other media have been deoped and are being used; however, s year a new medium was introced with initial results that exceed expectations.

he Defense Department, the State partment, the Agency for Internaal Development, and the U. S. Inmation Agency, in a joint effort, iated television broadcasting in the a immediately surrounding Saigon Feb. 7, 1966. Initially, the broad- originated from U. S. Navy Conlation aircraft equipped to transon two channels simultaneously n program material prepared in ance on video tape and 16mm scope films. Standard American mercial receivers were procured distributed. Since then the system been improved. About six weeks ago, on Oct. 25, a permanently installed high-power television facility commenced operation in the Saigon area. In addition, eight mobile trailermounted vehicles for the U. S. Armed Forces will be in operation to cover areas in the southern delta, northward along the coast, and in the central highlands. The U. S. Government will assist the government of Vietnam in building three additional stations to be located at Can Tho, Qui Nhon, and Da Nang or Hue.

The fundamental aim of this U. S.-assisted program is to "reach the Vietnamese people." Programs to bring the isolated people into the governmental family are of no use unless the program is understood. Without a means of quickly communicating with the multiplicity of hamlets and villages that exist, the government must either resort to roving teams of instructors or abandon the areas to the control of others.

The introduction of television into Vietnam was a bold step. Lessons learned there will be most valuable in approaching this again in other parts of the world.

First, what are some of the advantages of this step; secondly, what are the payoffs; and, last, what are some of the typical problems faced when introducing the latest form of mass audio-visual communications into underdeveloped areas?

The Vietnamese are people with a high sense of tradition and a diverse culture which employs the dramatic arts extensively. TV as a vehicle to provide classical Vietnamese plays, dramas and operas in their native language was a natural. The problem of illiteracy was overcome in that the people did not need to read to understand the message being put across. The times for television broadcasting were selected so that the working people would be reached in their homes during the early evening hours. Program material included news, educational programs and entertainment.

The introduction of TV was something that the entire Vietnamese family could enjoy. Their social structure, which, of course, is Oriental in nature, depends upon the close ties of the family and its maintenance of culture, pride and desire for freedom. TV can capitalize on these basic levels, motivations and social orders.

It can be tentatively concluded that TV may be introduced in an underdeveloped country with a high expectancy of success. Its value as a means of educating, informing and entertaining the people in remote areas can only be limited by your imagination. It could be a powerful tool for stabilizing governments during periods of social readjustment.

Such an experiment in Vietnam was not without problems. It is here that the greatest challenge to American ingenuity and industry is presented.

The standard commercial receivers are too complex for an uneducated individual in rural locations to operate, much less repair or maintain. The associated problem of antennas in fringe areas, the delicate tuning of channels, adjustment of the picture tube, fragility, and English-language markings all added difficulties at the outset. I am sure that there are solutions to all these problems. I visualize that a need exists for a mass-produced set, marked with the indigenous language of the people for whom it is intended, with simplified channel tuning, ruggedized, designed for battery or multiple frequency and voltage operation, and provided with more powerful audio amplifiers (say 25 watt) to accommodate outside speakers for community viewing. Another problem exists in the area of training indigenous technicians, engineering and studio personnel. The lack of a broad technological base in many countries inhibits the training of personnel to the U. S. standards of technical proficiency.

We have already witnessed the dramatic introduction of this medium of mass communication into Vietnam. We recognize its potential as an aid in countering communist-inspired insurgency operations—a capability to quickly and expertly apply production and technical know-how in serving the needs of other countries.

Here is a new dimension of communications-electronics to help win the wars of insurgency and, more important, to help sustain peaceful social, political and economic development.

The lessons we are learning in Vietnam are significant in planning our future course in communications-electronics.

We have learned that our conventional concepts of military communications systems must be extensively altered in wars of counterinsurgency.

However, the great American know-how in electronics equipment and mass production has responded magnificently to the environment in Southeast Asia. We must now capitalize on this tremendous American resource in bringing peace to the world and maintaining it.

This is an opportunity and a challenge which all of us welcome I am sure.

Address by RAdm. J. D. Arnold, USN, Dep. Chief of Naval Material (Logistic Support) at Ninth Annual Navy-Industry Conference on Material Reliability, Washington, D.C., Oct. 26, 1966.

RAdm. J. D. Arnold, USN

Systems Effectiveness and Combat Readiness

Improving the effectiveness of warfare systems is probably the most valuable single contribution any civilian can make to combat readiness of the fleet today. So individuals in industry and the Navy are all basically working toward the same goal: a more effective fleet.

After a continued attack over the last several years, the efforts of systems effectiveness engineers across the country are, cumulatively, producing the levels of systems performance the fleet requires. What I want to talk about is this: Engineering excellence is a worthwhile goal, to be sought by us all, but it is also necessary for the systems effectiveness engineer to include non-technical factors in his plans and calculations. Technical effectiveness alone is not enough.

If our fighting fleet is to have the stamina which marks the champion, considerations of logistics support and human factors engineering must be far more closely combined with engineering considerations than has usually been the case in the past.

One of Mahan's axioms is that effectiveness in battle depends in large part on proper logistics support. Every sailor knows instinctively that you can fight only as long as the essential material is on hand. "Essential material" means mainly "Bullets, Beans, and Black Oil." It also means "gear that works."

Before the war I served as senior flight test pilot in Hawaii. One old chief petty officer who worked with me said something I will always remember. He pretty well combined Mahan's thought with the basic concepts of systems effectiveness. He was talking about the R–1820 engine, which was one of the most powerful aircraft engines the Navy had in those days. "I like those engines," he said. "They don't break, and when they do they are easy to fix."

I'm afraid that if the Chief were still with us he would have a few other things to say. When I left the Pacific Fleet in September, I carried away the conviction that too many of our basic tools of sea power do break, and break too often, and when they break they are too hard to fix. In today's language they lack reliability and maintainability.

Let's deal in specifics: survival radios, for example.

These are the miniature radios pilots use to call for help in survival situations. They are the most important pieces of equipment carried by our pilots. Sometimes they are the last hope of a man who may die or be captured if his radio doesn't work.

I happened to be inspecting the supply section at North Island when a shipment of these little radios arrived. Because I know that there is no such thing as too many inspections on these items, I called for a carton of them to be opened and the radios tested.

We rounded up a battery and went across the street to a test shop. The second and fourth radios, out of the six in the box, didn't work. Later we found that a plastic wafer had been left out of the on-off [illegible]

copter sonars. The Navy has been operating anti-submarine helicopters for more than a decade. You would think that by now we would have waterproof, flexible cable for lowering the sonar from the helicopter into the water. Well, the cable is flexible.

Name a radio or an avionics package, and I'll name a system that doesn't perform as it should.

Small systems aren't the only troublesome ones. I am about to name a few airplanes, but I want it to be understood that I am not criticizing the airplane manufacturer, or at least not him alone. Our problems, generally, are in the black boxes which ride inside the airplanes. The engines in the airplanes, the mechanical and hydraulic systems, the planes themselves are superb products of the American aircraft industry. It's the gadgets inside—radars and other electronic systems that cause the trouble.

Most of you know that the E-2A early warning aircraft, the A-6 attack plane and the RA-5C reconnaissance aircraft had severe reliability problems when they first entered service. The mean time between failure of their primary sensors, data links, computers and radars was measured in minutes. These planes were bought by the Navy to be the finest and most advanced machines of their types in the world. And they are, but only part of the time.

I'm glad to say that their performance in the fleet has improved and is much better than it was only a few months ago. After 470 major engineering changes on the A-6 and 1,400 minor ones, with all that these changes imply about configuration control and spares support, the fleet units had a pessimistic outlook when they first received the planes. Now, in general, performance in service exceeds expectations and these planes are, in fact, superior weapons.

But each of these planes, and every other first line aircraft that I can think of, achieves the necessary performance at the price of an excessive upkeep effort. At one time, more than two dozen contract technicians were aboard the Kitty Hawk in the South China Sea, working with our crewmen to keep the ship's E-2's and RA-5's "up". They were reasonably successful, but we don't intend to make the fleet a test and development force. The place to create systems effectiveness is ashore.

The real point is that overall effectiveness of these planes was degraded and their battle readiness reduced because a disciplined approach to systems effectiveness was not applied to them early enough or strongly enough.

I do not want to seem excessively critical, and it is true that the Navy-industry team generally produces quality systems. But most of these systems perform well only because the most limited resource the Navy has, sailor-hours, or more precisely, perhaps, maintenance talent and time, are lavished upon them.

A number of life cycle cost studies recently showed that maintenance and operational costs throughout the life of a typical system ran from six to 70 times the original cost of the item. Two-thirds of the maintenance costs were for technical talent—brainpower. Maintainability and repairability are certainly areas of systems effectiveness which must be brought under control promptly.

As an example of what I'm driving at, two A–4's—that we know about—were lost because of faulty design for maintainability. In each case, a maintenance man had dropped a nut into the fuel cell. Why?

Installation of a fuel pump on an A–4C requires removal of the engine—a 16-manhour job. It then takes two men four hours to remove the fuel pump. The last nut is removed by use of a special tool and by feel.

In spite of warnings following loss of the first aircraft, a second was lost a month later for the same reason. Those of us who are concerned about maintenance wish some maintenance engineer had looked at this installation early in the game. The A–4 is an execeptionally well designed and reliable machine, but a revised installation method or a screen over the fuel pump inlet might have saved two—at least two—A–4's.

I wish maintenance didn't require so many special tools. A mechanic on a carrier is always working in close quarters, aircraft are packed tightly together, lighting is barely adequate, and the special equipment is usually at the other end of the hangar bay. Pressure to get the planes back into the air is always present. As a result, a certain number of nuts are going to be dropped. But no more, I hope, into fuel pumps.

All of us here today are managers of one sort or another, and it is the business of managers to deal with exceptional situations, to be concerned with problems, to correct difficulties and to set things right. If we did not believe that there is much to be set right, we wouldn't be here. And we might as well recognize, collectively, that it is upon this group, and very few others like it, that the ultimate responsibility rests for delivering to the operating forces of the Navy and the Marine Corps the effective systems they need. There is challenge a plenty for all who manage technical warfare systems.

One of the principal mechanisms which binds managers together in the business of creating weapon systems is the contract. Well-engineered systems (those which don't break and are easy to fix when they do) result, in part, from a firm meeting of the minds between the Navy and industry, between buyer and seller.

A contract is a legally enforceable agreement, and it is a good bit more. Members of the Navy-industry team have varying points of view—complementary and interdependent points of view, differing but not necessarily conflicting perspectives—on the real meaning of a contract.

Considering a contract not only as an agreement, but also as a vehicle for increasing say, systems effectiveness, let us examine three separate points of view: those of the project engineer, the contracting officer, and the businessman.

A good many of the project engineers I have known tend to think of a development or production contract as an administrative tool; a tool which helps get done what they want done. The basic concern of the engineer focuses on the technical excellence of the end product. To him costs and enforceable agreements are important, but I think that primarily most project engineers regard a contract as one more milestone on the long road linking concept formulation with successful deployment, at sea, of the final product.

I won't try to describe the viewpoint of the "typical businessman," if there is such a soul, except to say that I have heard many successful bidders talk of their contracts as being filled simultaneously with promise and with peril, with certainty and with risk, and with obligation as well as opportunity.

The contracting officers take still a different perspective. Some, the minority, feel that contracting is simply a straightforward legal function, completely separate from the technical characteristics of the items contracted for. This type of contracting officer says, "Write down your technical requirements, forward them with a procurement request, and I will prepare a legal contract." To him systems effectiveness is a legal result of including standard military specifications in the contract.

A more imaginative officer would talk a broader view. He might say to the project engineer, "I'll tell you how to get more bang for your buck, more rubble for your ruble. We will work together during the development period. We'll work up a first-rate advance procurement plan. I'll show you how you can design 'procurability' into your system."

This fellow recognized the value of planning, during the development process, for eventual procurement. He will probably attempt to plan well enough so the item can be procured through a fixed-priced contract. He may work out a multi-year buy, or some other type of imaginative approach.

Still a third contracting officer might take an even wider perspective on his ability to influence the effectiveness of the system to be contracted for. "Write your specifications in such a way that we can offer incentives: payment for better performance, higher reliability, superior maintainability," he will urge.

This individual is really talking about incentive contracting which has only begun to be exploited as a mechanism for rewarding businessmen who produce systems of superior effectiveness.

More and more in the near-term future, the most astute contracting officers will lean toward incentive contracting where this form of contract makes sense. But they can do this only as readily as the engineers help them design and pin down, with audit accuracy, the value to the Government of increased systems effectiveness.

I positively foresee that the contracting pendulum will swing toward more incentive contracts during the next few years. To an increasing de-

gress in the future, incentive contracts will reward or penalize those who build or don't build effective systems.

There is no question in my mind that the main improvements in effectiveness in the near-term future will result from increased emphasis on incentive contracting. Every sign points that way.

In the last four years, cost-plus-incentive-fee (CPIF) contracts, as a percentage of DOD contract dollars, have doubled. This year about one procurement dollar in twelve will change hands under a CPIF contract.

During the same period of time, the value of fixed-price-incentive (FPI) contracts has increased by one-third. This year, one DOD purchase dollar in six will be awarded on a FPI Contract.

At this moment almost $800 million is being offered in incentives for superior contractor performance in the shipbuilding program. Some 46 ships are involved. One of the principal incentive features is that standardization of equipment within the ships—pumps, valves, motors and the like—is, for the first time, a goal to be sought by the contractor and rewarded by the Government. This can be done because a number of skilled people for the Naval Ship Systems Command proved positively that the Government would receive more than $800 million worth of value if the pumps and valves were similar, not different.

Multiple incentives in contracting are relatively new, but will become more and more common during the next few years. Incentives for cost, schedule and performance improvements are likely to be offered whenever the Government can measure, with reasonable accuracy, the worth of the improvement.

One of the big questions, and a hard one to answer (at least with answers that will bear up under audit) is what should the Government pay for increased performance—for increased systems effectiveness. Converting "worth to the Government" into specific, justifiable dollar values is one of the prime problems in the field of contracting today. Its solution depends largely on improved data collection and input from engineers who think in terms of overall systems effectiveness.

Examination of military worth quickly leads to examination of basic tactical and strategic assumptions, to trade-offs between the various elements of life cycle costs, and to fundamental questions of cost effectiveness.

This area is full of pitfalls. What is the true value of standardization, improved safety levels, improved crew member efficiency? How do you handle change orders without jeopardizing the contractor's opportunity for reward?

How much value do you place o meeting major milestones, and ho much on meeting the final deliver schedule? All these and many othe questions have to be answered, no only by the military side of the tean but also by industry.

Certainly incentive contracts, an especially multiple incentive con tracts, will have an increasing impac on systems effectiveness.

Defense Department Cited for Support of Sheltered Workshops

The Defense Department has been cited by Harold Russell, Chairman of the President's Committee on Employment of the Handicapped, for its support and cooperation in encouraging defense business participation in the sheltered workshops program.

The commendation was presented to Assistant Secretary of Defense (Installations and Logistics) Paul R. Ignatius during ceremonies at the Pentagon on Dec. 20.

DOD's program to help workshops includes a directory listing the productive capabilities of over 200 work shops which has been distributed to all DOD procurement officers throughout the country. Secretary Ignatius has stated that procurement officials in the Military Departments and the Defense Supply Agency should consider including workshops on bidders' lists for items they can produce. In addition, a leaflet, carrying DOD's endorsement of the workshop program and encouraging prime contractors to "give workshops every opportunity to compete for subcontracts" is attached to every prime contract awarded by the Defense Department.

Also, workshop directors are provided schedules of locally sponsored DOD procurement clinics so that they can attend those held in their vicinity.

Assistant Secretary of Defense (Installations & Logistics) Paul R. Ignatius, left, accepts a commendation from Harold Russell, Chairman of the President's Committee on Employment of the Handicapped.

(*Continued from Page 4*)

permitted to employ a single appropriation for each DOD component for all operating costs combining the existing appropriations for military personnel and operations and maintenance. Such an amalgamation would greatly facilitate the budgeting and accounting for operating costs. But even if two separate appropriations are maintained, DOD will still combine them for internal purposes and convert for external reporting purposes at the headquarters level. The Navy is already receiving reports which reflect full costs including costs of military personnel of all units of both the Atlantic and Pacific Fleets.

The third change is the purification of appropriations so that all expense items are associated with the operating appropriations and none with the procurement or construction appropriation. Primarily, this involves shifting many items of spare parts and similar consumables from continuing appropriations to operations. It also involves moving a few capital items from operations appropriations to continuing appropriations. Once this is fully accomplished, all expenses, and only expenses, will be included in the operating appropriation. DOD Instruction 7040.5, "Definition of Expenses and Investment Costs," dated Sept. 1, 1966, carefully spells out the criteria governing this purification. The care with which the instruction was developed is demonstrated by the fact that it consumed five months of steady effort, went through 13 separate revisions, and was analyzed in three separate DOD-wide reviews.

The final action necessary to achieve the goal of charging 100 percent of measurable expenses to operating activities is the extension of working capital to cover all items in the operating appropriation. Such an extension allows the association of costs with the using activity at time of use. Under the former system, purchases were often made and the appropriation charged by a central organization long before and far from the time and place of use. Centrally procured fuel or aviation spare parts are examples of this. Such material was then furnished "free" to the ultimate user. Since these expenses were not charged to him, the user had little motivation to give them the kind of management attention he gave to items which actually cost him money. Working capital solves this problem by permitting costs to be held in suspense from the time of purchase until the time of issue for consumption. At the time of issue for consumption, they are charged to the user.

Working capital is not a new concept. Many supply items are currently held in stock funds, and many services in industrial funds. Stock funds will be extended to include all consumable material, at both wholesale and retail levels, and industrial funds will be expanded to include those wholesale service activities not now under them. Finally, working capital accounts within the operating appropriation will be established for local services, such as maintenance and the motor pool. The realities of a combat environment will be recognized by charging for operating resources at the time of movement to the theater.

Effect on the Budget. The budget process will change radically as a consequence of Project PRIME. The FY 1968 budget will be converted to expense terms prior to July 1, 1967, when the new system becomes effective. FY 1969 will see a full-scale combined program/budget submission and review in expense terms by program elements and organization units within DOD. Congress, of course, will retain the option of receiving it on this basis.

Outlook for the Future. Project PRIME means that the manager's flexibility in deciding on what resources to use should be increased. He should be encouraged to think about, for example, the best balance between military personnel, civilian personnel and contract personnel, or the optimum degree of mechanization, in a wide variety of situations. With the financial segregations that now exist, managers have little incentive for investigating such alternatives.

It means also that there should be a tendency on the part of top management to move in the direction of control of aggregates and away from control by bits and pieces. It would be expected that, as time goes on, there will be less emphasis on individual items of expense—less detailed control of manpower and less detailed consumption rules for example—and more emphasis on expenses as a whole.

Finally, the system should motivate managers to be more concerned about the efficient use of resources. Of course, efficiency is only one criterion for judging a manager, and attention to efficiency must never be permitted to overshadow the criterion of effectiveness, which means getting the job done, and done well. But managers do need to know how efficiently their subordinates are performing their assigned missions, and the new system will help them learn this. Moreover, as performance measurement criteria change to incorporate this additional information, the motivation will be increased for managers to be concerned with the wise use of resources, thereby reducing the need for exhortation, inspection, specified constraints, and other devices that are now used as a substitute for a built-in motivation.

Conclusion.

When Project PRIME "goes live" on July 1, 1967, it will not function as a perfect and complete invention. The system faces many modifications and probably years of refinement. While the first programming system directly affected a few hundred people working in the Pentagon, Project PRIME will affect thousands throughout the entire Defense establishment. The extent of the job to be done in education alone is staggering.

Nevertheless, Project PRIME will achieve one fundamental goal of PPBS. It takes off from a meaningful structure for planning and makes possible realistic appraisal of the degree to which the performance has fulfilled the plan.

The environment never stands still and the Defense management control process in the United States is constantly seeking to overtake a continually changing problem. Project PRIME may represent a large enough step to overcome this situation for a while and, thus, gain some time for beleaguered Defense managers. It will, at least, restore to the legislature visibility with respect to Defense matters that some believe has been seriously eroded over 130 years, and will materially assist in the proper discharge of its constitutional responsibilities.

PPBS is no panacea. It is a good idea, a part of an evolutionary stream of ideas. It requires refinement and innovation if it is to remain useful in coping with a dynamic environment moving at an accelerating pace.

Industrial Security— Is it Necessary?

by
Capt. Frank Larsen, USN

Occasionally we hear the complaint that security controls create bottlenecks for industry, however, more and more businessmen today are recognizing that security procedures within their operation are as much a part of their businesses as budgeting, planning, production, or auditing.

Why are industrial security controls necessary? For this simple reason: to deter espionage against industrial capacity of the United States. In analyzing the espionage threat there is often a tendency to go to extremes. There are those who would magnify all aspects of the threat and so become prophets of gloom. Others would discount the capabilities of hostile espionage and magnify their internal difficulties. However, it is always more dangerous to underrate than to overrate an enemy. For instance, U.S. experts predicted in 1946 that the Soviet Union would not have an atomic bomb before 1960. The world was shocked when the Russians exploded their first bomb in 1949, eleven years in advance of the predicted date. Our scientists made this estimate, based on the lead time needed to develop a workable device for this nation. This 11-year pole vault in technology can be attributed in part to the Communist's success in espionage—successful in that they were able to steal vital elements of information that reduced the lead time they needed to develop this bomb and at the same time avoid the errors and trials that we encountered before success was achieved. We need only look at today's newspapers to recognize that the hostile threat of espionage directed toward the United States appears to have increased rather than diminished. We must be prepared to meet this hostile threat.

In order to clearly understand the relationship of industrial security to the process of manufacture of defense products, it is necessary to break down the process of production. First there is the idea. This is the beginning of lead time. Lead time is defined as the time span beginning when any defense project, program, or system originates an idea in the mind of someone either in industry or in the Government and extending to its completion or production. Once the idea is deemed to be so vital to our defense that its compromise would affect adversely our national defense interest, a classification, indicating the degree of importance to our national defense, is applied to the idea. The next step is to research and develop the idea, i.e., take it from the idea stage and place it into a tangible form such as a drawing, specification, or proposal. Industry most frequently is designated as the research and development agency. From this stage the project goes into testing of a prototype or model. Testing is done either by industry or by the Government. In any event, through these three stages of what we call lead time, industry is entrusted with vital defense information.

The next stage is production. In the production stage, protection of information by industry must be afforded and must extend in many instances through the stage of delivering the product into the ultimate possessor's hands. When the product is in the hands of the Government, we feel that the secret has been kept. However, industry is still afforded access to the information by virtue of continued production of the system, or the necessity to maintain or perhaps modify it. The period from the conception of an idea to the realization of the end product in the possession of the Government may be weeks, months and even years. Throughout this period of lead time, many people in industry, as well as in Government, will be afforded access to the classified information involved.

Capt. Frank Larsen, USN, is the Chief of the Office of Industrial Security, Defense Contract Administration Services, Defense Supply Agency. He was assigned to DSA in 1965 as Chief of the Field Management Division. In this position he had responsibility for the management of the military and civilian security personnel in the 11 Defense Contract Administration Services Regions across the country.

The real objective of the industrial security program is to maintain the security of classified information throughout its life, from its birth as an idea until such time as the proper authorities in Government determine that it can be declassified.

How do we achieve this objective? One method might be cooperation, which implies the dual effort of industry and Government. If industry does its part and Government carries out its obligations throughout the period of production, security can be maintained.

The Defense Industrial Security Program is the Government's technique for protecting classified defense information entrusted to defense contractors. The technique is set forth for industry in the "Industrial Security Manual for Safeguarding Classified Information" (Attachment to DD Form 441). The manual is the book of rules for carrying out a specific security agreement signed by the Government and the defense contractor. The requirements of the manual are both realistic and practical having evolved from many years of experience in countering espionage activity.

While it might appear that security requirements have been expanded in the latest edition of the manual, the principles of the original documen have not changed. Specifics as to tech niques have been set forth and sam ples of forms and other guidance have been published to assist the contractor in doing a better job in safeguarding vital information entrusted to him.

A simple formula, which explains how the program works, is this: a "clearance" plus "need-to-know" equals "access." In effect this formula indicates that before an individual is authorized access to classified defense information, he must have an appropriate company and personnel security clearance equal to, or higher than, the degree of classification of the information to which he requires access. Hence we come to the second part of the formula which is equally important: a need-to-know the information in order to accomplish an official objective. One without the other of these two elements indicates that the person is unauthorized. If unauthorized he cannot legally be afforded access to classified defense information.

We feel that our efforts in Government are only partially successful if

we merely set forth requirements. The major portion of the mission must be accomplished by industry—industry must implement the program in industry. We assist, advise and monitor the individual contractor to insure that the program he has in effect meets the requirements of his security agreement with the Government.

Within the Industrial Security Manual are set forth all the specifics that are needed in order to maintain a successful program within a contractor's facility. It takes an organization in order to set forth the requirements, render advice and assistance, and then monitor these requirements as industry implements them. This organization is the Office of Industrial Security under the Deputy for Contract Administration Services of the Defense Supply Agency (DSA) at Cameron Station, Alexandria, Va.

There are three divisions in this office:

• The **Programs and Systems Division** establishes policy and procedure—the Industrial Security Regulation, which controls the Government's requirements; the Industrial Security Manual, which establishes industry requirements; the Cryptographic Supplement to that manual for these contractors who will require access to cryptographic information; the Industrial Security Operating Manual for Government field personnel; and other publications, such as industrial security letters to contractors and industrial security bulletins to Government agencies.

• The **Field Management Division** maintains operational control over the Offices of Industrial Security in the 11 Defense Contract Administration Services Regions to assure a uniform application of the program nationwide.

• The **International Programs Division** is a new element within the Industrial Security Program. Its establishment was necessitated by the initiation of sales of U.S. defense hardware to allied nations. When classified information becomes involved in doing business with foreign contractors, the International Programs Division acts as a catalyst between the United States and foreign governments and their contractors. In addition, when foreign governments or contractors desire to place foreign classified jobs in U.S. industry, it is the mission of the International Programs Division to assure that their classified information is protected.

In addition to the central Office of Industrial Security at DSA headquarters and the 11 regional offices across the nation, a central Defense Industrial Security Clearance Office (DISCO) was established to process security clearances of industrial employees. DISCO was established in Columbus, Ohio, in March 1965. It was the result of a consolidation of Army, Navy and Air Force industrial security offices. It is to this office that contractors, once they have a facility security clearance, direct their requests for employee clearances. Files of all contractor employees' clearances totaling over a million and a half, which the Defense Department has issued to date, are maintained in this office. The files also contain a central record of all cleared U.S. defense contractors, totalling nearly 15,000 facilities.

Each Defense Contract Administration Services Region has an Office of Industrial Security which functions as the cognizant security office for all defense contractors in its geographical area. It is from this office that clearances of facilities are issued and it is here that contractors' programs for the protection of classified defense information are monitored.

It might appear that the mission of the Office of Industrial Security is well under control; that there are no further requirements. But improvements are coming.

Computers, for example, constitute a new technology in the processing of classified defense information and record keeping. Contractors and the Government are developing new standards for insuring security of the information processed by these machines. We are attempting to speed up our clearance actions for company employees as well as for new facilities.

We are constantly striving to improve the quality of our security inspections. An industrial security representative in the field does a disservice to industry when he does not point out where it is deficient. We are satisfied that industry will do an adequate job if it knows what to do, is given advice as to how to accomplish it, and is periodically monitored to assure that the application of procedures is current. This confidence to date has not been misplaced.

Much progress has been made in the approximately two years that consolidated industrial security has been in operation. Industry is implementing the program. In fact, the majority of all cleared defense contractors maintain at least an adequate industrial security program today. In instances where deficiencies exist, contractors have taken the most expeditious action to correct them, thereby improving their programs.

The Government security team is exerting the maximum effort to prevent hostile espionage. Success of the program depends on industry's efforts to carry it out.

Contractors Cited for Zero Defects

The highest honor in the Zero Defects Program an Air Force prime contractor can receive has been accorded to eight defense firms in recognition of outstanding records in the field of industrial zero defects during the past 18 months.

Presented for the first time, the Air Force Craftsmanship Awards went to three divisions of the Radio Corporation of America—the Astro-Electronics Div., Princeton, N.J.; Communications Systems Div., Camden, N.J.; and Missile & Surface Radar Div., Moorestown, N.J.

Other contractors who received awards are the General Electric Co., Flight Propulsion Div., West Lynn, Mass.; General Electric Co., Evendale Facility, Cincinnati, Ohio; Lockheed Missile & Space Co., Sunnyvale, Calif.; Aerojet General Corp., Sacramento, Calif.; and Douglas Aircraft Co., Missile & Space Systems Div., Huntington Beach, Calif.

To win the Craftsmanship Award, each firm showed performance records for at least 18 months clearly reflecting achievements against pre-set goals. Contract administration personnel with either the Air Force Systems Command's Air Force Contract Management Div., Los Angeles, Calif., or the Defense Contract Administration Services validated the performance data and determined the adequacy and realism of the goals.

A select number of employees from the eight firms are being given Craftsmanship Award pins and their names are inscribed on an accompanying scroll. In addition, Zero Defects banners go with the award and are being formally presented to the employees as a group.

Army Pilot Training Increased

The U.S. Army is planning to temporarily increase its monthly training quota of pilots from 410 to 610 and plans to expand existing facilities to handle the increased training load.

All primary helicopter training is now conducted at Fort Wolters, Tex., which will be expanded to handle additional trainees.

To provide additional training facilities, the planned close-out of Hunter AFB, Ga., will be extended beyond next July and will be used in conjunction with the Army's nearby post at Fort Stewart, Ga.

Advanced flight training and transition training are now carried out at the Army Aviation Center, Fort Rucker, Ala. Various tests and development activities are also performed there.

Air Force Participation in the Development of SAIMS

by

Lt. Col. Hans H. Driessnack, USAF
Asst. to Dep. for System Management
Office of Asst. Secretary of the Air Force (Financial Management)

During the last few years we have witnessed an increase in activity in DOD directed toward improving management in the weapons acquisition process. Some of this activity has resulted in the issuance of DOD directives and manuals to which the Services and industry have been required to respond. The most notable of these have been: DOD/NASA PERT Cost Guide; DOD Directive 7041.1, "Cost and Economic Information System (CEIS);" and DOD Directive 3200.9, "Contract Definition."

More recently, the Defense community has been exposed to some new nomenclature in the form of Resource Management Systems, Assets Management Systems, Selected Acquisitions Information and Management System (SAIMS), Cost Information Reports (CIR), Contract Funds Status Report (CFSR), and a Performance Measurement System.

Simultaneously, the Air Force has also been engaged in an extensive effort to improve its overall management capability in this area. Manuals on configuration management and management of contractor data and reports are products of this general effort.

Still another project being undertaken by the Air Force Systems Command (AFSC) has been directed toward improving the command's capability to develop credible cost estimates and strengthening the command's program cost control capability. Some of the results of this effort have been the AFSC Cost Information System (CIS) and Cost Accomplishment System.

This apparent proliferation of management systems, with their attendant reporting requirements, is undoubtedly the most talked about and least understood effort currently under way in DOD. The purpose of this article is to place these various efforts in proper context and to describe the Air Force approach for an improved financial management system which satisfies the DOD concepts and objectives.

The DOD Framework.

During the past several months, the Assistant Secretary of Defense (Comptroller) has made several public pronouncements concerning Resource Management Systems. He has defined Resource Management Systems as "all the systems that aid DOD management in their task of assuring that resources are obtained and used both effectively and efficiently in the accomplishment of DOD objectives." The systems which are included within this definition are:

- **Programming and Budgeting System**—concerned with the process of planning for resources to meet stated objectives and justifying these needs to Congress.
- **Operating Management System**—directed toward the management of resources applied directly to and in support of the operating commands in DOD.
- **Inventory Management System**—concerned with the process of planning and control of the myriad of items which flow through DOD's gigantic supply systems.
- **Acquisitions Information and Management System**—concerned with the management of weapon and support systems acquisition process.

The last two system areas—Inventory Management System and Acquisitions Management System—are combined under the heading of Assets Management. This is graphically presented in Figure 1.

The first three areas are primarily concerned with DOD in-house management functions; however, the fourth area—Acquisitions Information and Management System—requires close involvement with industry. A more complete discussion of this area is the real objective of this article.

Selected Acquisitions Information and Management System (SAIMS).

Under the heading of Acquisitions Information and Management System, there exist several subsystems, each of which requires some interchange between DOD and industry. There are basically two categories of subsystems—one specifically concerned with "selection" acquisitions and one directed at "other" acquisitions. The first category has been named Selected Acquisitions Information and Management System (SAIMS). SAIMS is defined as the system concerned with

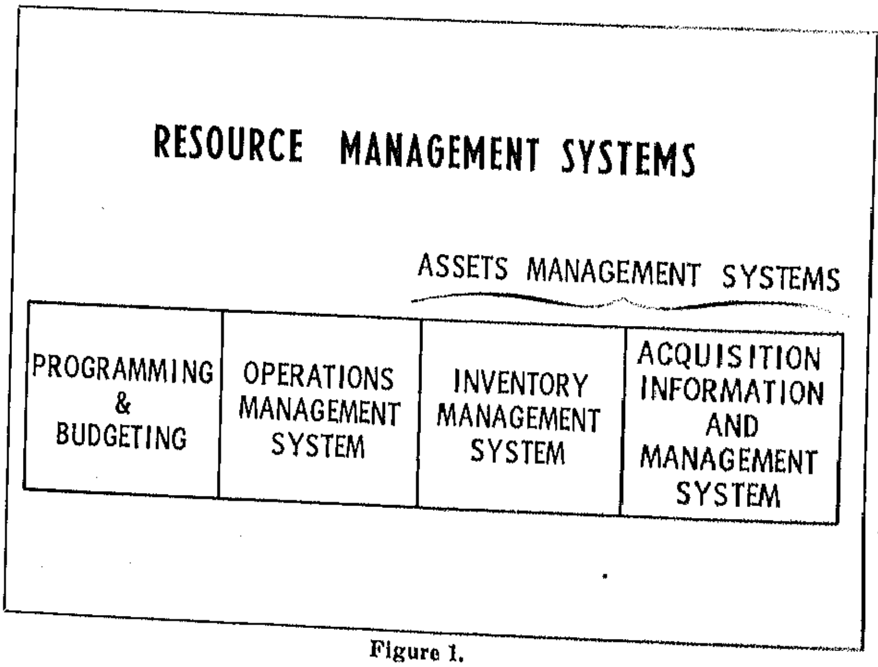


Figure 1.

the management of the acquisition of selected capital assets. This is the process of acquiring weapon and support systems of the quality and configuration needed by DOD, on schedule and at lowest cost. The relationship of the components of SAIMS within the overall Resource Management Systems effort is illustrated by the diagram shown in Figure 2.

The SAIMS concept can be considered as a reorientation and consolidation within a single DOD framework of several components that have been undergoing development for some time. Referring to Figure 2:

- Items two, three and four, prior to reorientation, were the basic parts of the DOD Cost and Economic Information System (CEIS).

- Items three and four were included as basic components of the AFSC Cost Information System (CIS). CIS, initially outlined in AFSC Letter 173-2, Oct. 1, 1965, was essentially an integration of several contractor cost reports (similar to the CIR and CFSR then under development) and four in-house reports The approved DOD reports for CIR and CFSR have now replaced their AFSC counterparts in the CIS, as planned, thus insuring that no overlapping or duplicate reporting requirements exist.

- Items five and six are treated in the current draft specification on Schedule and Cost Planning and Control, originated by the Office of the Secretary of Defense (OSD), and embody the same concepts contained in a similar specification currently in use by the Air Force.

Economic Information System (EIS).

The Economic Information System reports are concerned with plant-wide information as well as program-oriented information. EIS is designed to collect the data necessary for analysis of the economic impact of defense spending by geographical area and industry. It requires reporting on many programs and includes data on commercial as well as Government sales.

Contract Funds Status Report (CFSR).

The Contract Funds Status Report was developed to provide information about contract funding requirements by fiscal year for specific programs to assist the program director in:

- Updating and forecasting contract fund requirements.

- Planning and decision making on changes in fund requirements.

- Developing fund requirements and budget estimates in support of approved programs.

Where specifically designated in contracts, this report will supersede use of the familiar DD Form 1097 and other similar funds status reports.

Cost Information Reports (CIR).

The Cost Information Reports have been approved by the Bureau of the Budget. There has been a general orientation effort explaining CIR to industry sponsored by the Office of the Assistant Secretary of Defense (Comptroller). Since DOD documents on CIR are now available, it will not be discussed in any detail in this article. However, in order to clarify how CIR fits into the overall SAIMS effort, some general comments are required concerning what CIR is, and is not.

CIR was developed primarily to provide information on actual costs, incurred as well as estimated costs, to complete programs throughout the acquisition cycle of a program in a consistent manner. The data will be used in support of cost estimating, programming, budgeting and, where applicable, procurement activities. Additionally, this same information will be used as input to a data bank for use in developing cost estimating relationships and cost estimates for future programs. The mechanism for controlling the use of CIR reports is the CIR Data Plan, indicating the items to be covered by the report and the level of detail. A CIR Data Plan must be submitted for each weapon/support system where CIR is to be implemented. The plan must be reviewed and approved by the OSD CIR Data Plan Review Committee prior to implementation.

It should be understood, however, that CIR and the requirements for CIR Data Plan approval wil'
way be construed to prescribe

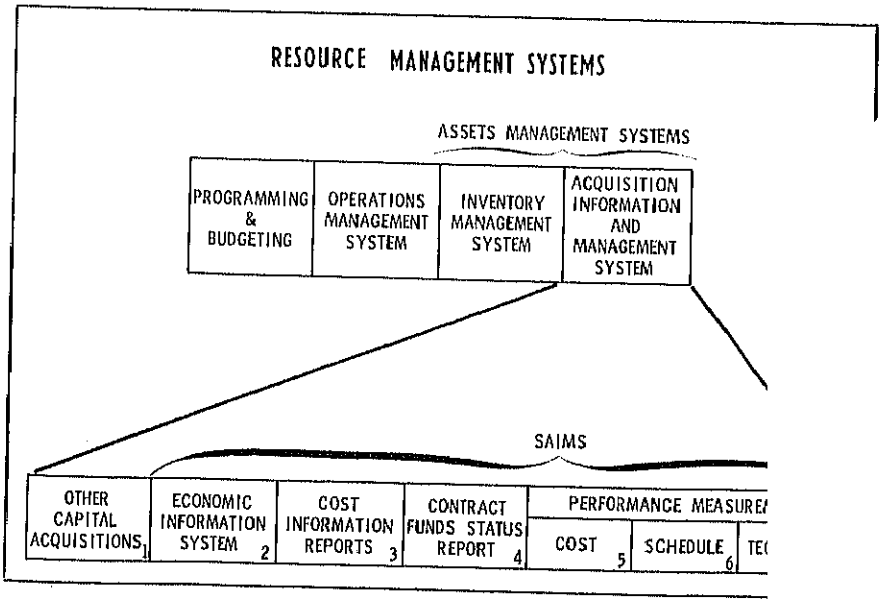


Figure 2.

tion which does not specify procedural detail, but does spell out criteria, general characteristics and desired reporting requirements. Where effective management control systems are in use by contractors, there is no intent to change them. Rather the approach is to interlock the Government reporting requirements directly with contractors' internal systems.

Having discussed how the various systems and components fit into the overall Resource Management Systems framework, the next area that requires some explanation is the current Air Force efforts to respond to the overall DOD framework and, more specifically, the DOD SAIMS development program.

The Air Force Approach to an Integrated System.

In the past, Government management systems have frequently addressed only fragments of the total management information problem. Typically, too little thought has been given to the relationship of the subsystems or components to overall information requirements. This kind of approach has often resulted in overlapping or duplicate requirements, omissions, confusion and, in the end, ineffective systems.

While we are still addressing the overall information problem by its components, we are now doing so with the total system design well in mind. Additionally, we are providing the flexibility to add the other related components as they are developed.

The Air Force has recognized that what is really new in the design of management systems within DOD is uniformity of approach to provide the information needed without a disproportionate diversion of resources by the Services and industry. While all areas of reporting are continually being reviewed, particular emphasis has been placed in the area of financial management information. Under the guidance and direction provided by the Assistant Secretary of the Air Force (Financial Management), the Air Force has been working to develop a financial management information reporting structure which recognizes the real need for different kinds of financial data, yet minimizes the volume and variety of reports required by relating them to each other in a single integrated framework. In addition, the financial data is directly related to schedule and technical performance information.

Since the focal point for systems management is the System Program Office (SPO), and since the Air Force point of contact with industry is also the SPO, the logical place to integrate any management system requirements into a meaningful product is at the SPO level. The approach being taken provides the overall framework within which the SPO can more effectively exercise its business management responsibilities and can also be more responsive to higher echelon requirements. There are three key areas which tie this approach together into a single meaningful system:

- An integrated financial management reporting system which provides useable summary data for all echelons of the Air Force.
- A specification for program planning and control which outlines the criteria that an acceptable system must meet.
- An integrated work breakdown structure which requires both Air Force and industry participation in order to identify all elements with which the contract is concerned.

Financial Management Reporting Structure.

There are currently nine major programs in the DOD program budget structure. Each of the programs is separated into elements and for each of the program elements the cost categories of research and development, investment, and operating costs are considered. However, in SAIMS we are concerned primarily with the research and development and investment costs of the major program elements. To illustrate the foregoing: Program IV, Airlift, contains, as a program element, the C-5A. This is a major support system which is a selected acquisition and has been designated for management emphasis.

The primary management document within DOD for communicating what the currently approved plan is for any given program element is the Five Year Defense Program (FYDP). The Services are required to document their requirements in support of the Five Year Program and any changes that may be made to it. This is normally accomplished by the SPO using inputs from all contractors and Government agencies concerned with the program. This information is consolidated, analyzed and submitted through channels to OSD as a Program Change

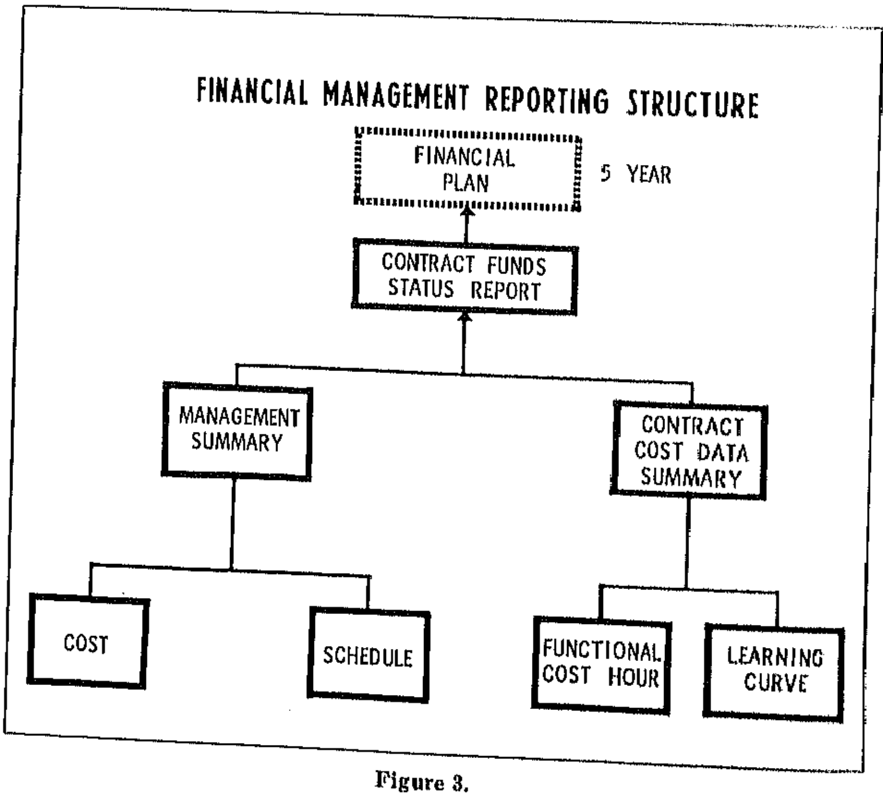


Figure 3.

Request (PCR). If the change is approved, the Five Year Program is amended and funds are made available, or deleted, to cover the revised program.

Contract Funds Status Report (CFSR).

In the Air Force, the reporting documents submitted by industry to the SPO, outlining contract funds requirements, have been the DD Form 1097, Contractor Financial Requirements Estimate (CFRE), and local forms. The Office of Assistant Secretary of Defense (Comptroller) is currently developing a Contract Funds Status Report (CFSR) for this purpose. This report, when requested by the SPO, will replace the DD Form 1097 and all similar funds status reports in current use.

The CFSR is designed to provide funds information by fiscal year. This report enables the Air Force to provide OSD with a more detailed analysis of total fund requirements and identifies the basis on which the Five Year Program estimates were made, i.e., whether future requirements are on contract, authorized, identified, or merely contemplated.

However, the projection of fund requirements for future years means very little unless it can be supported by actual cost experience and some measure of performance against the program requirements to date. The reporting structure showing this kind of a relationship is shown in Figure 3.

The Contract Cost Data Summary was designed to provide cost data for the total contract broken out by recurring and non-recurring costs. Though primarily designed to collect actual cost data for analysis in support of budget requests and PCR's, the same cost data are input to a cost data bank for developing cost estimating relationships and cost estimates for future systems.

For selected hi-value items, such as airframe and engine, which constitute a significant part of the costs of a total system, further backup is required. For these selected items a Functional Cost Hour Report may be required to be submitted along with the Contract Cost Data Summary.

In those cases where the system is entering production, a Progress Curve Report may also be requested for the selected hi-value items cited above. These reports, which provide a different grouping of the cost data, serve as additional backup information in support of PCR's, budget requirements, future estimates, etc. Cost data from these reports also provide input to the data banks.

The reports described in the foregoing provide basically the same information most major contractors have previously submitted to the Air Force as a requirement of the Contractor Cost Study.

These reports do not satisfy the program director's management information requirements, however.

A Management Summary Report of some type is required on a monthly basis to provide an assessment of the contractor's performance to date against contract requirements. It should answer the questions: What is the value of work accomplished to date? This report should be derived from the contractor's internal planning and control system. It should contain traceable information from the contract line items through the contractor's internal control systems and be capable of flagging potential problems in sufficient time to permit corrective action. This same report will also assist in the analysis of fund requirements.

The Management Summary Report should be supported by narrative problem analysis and/or variance analysis reports designed to provide an assessment of actual and potential problem areas (whether they be cost, schedule, or technical) which impact on contract performance.

The reporting structure, shown in Figure 4, has been developed in such a way that the reports are interrelated, serve the SPO's financial management reporting requirements, provide the information required for higher level budgeting, programming and PCR procedures, and satisfy the SAIMS objective. Particularly important is the fact that all of the reports are derived from the same basic contractor data. However, for the reported information to have real value, the data must not only be derived directly from the contractor's systems, it must also represent the way the work is actually accomplished and the costs are actually accumulated.

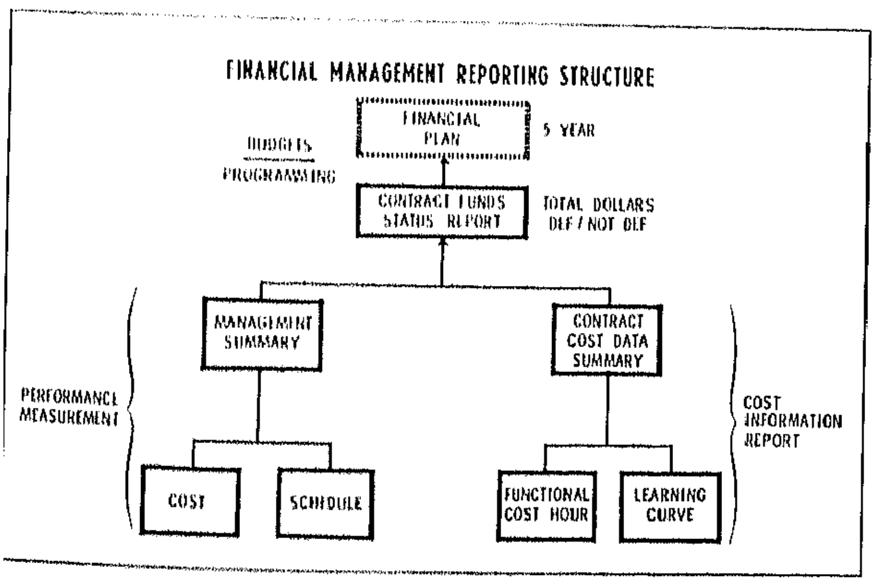


Figure 4.

Criteria for Evaluating a Contractor's System—A Specification

In past years a number of techniques have been developed within DOD specifically designed to provide some measure of contractor performance, particularly in the area of costs and schedule.

While the basic concepts and objectives of most of the techniques developed were very similar, they usually resulted in additional reports being levied on the contractor.

These techniques, like PERT COST, were often indiscriminately implemented—sometimes on top of perfectly valid existing contractor systems—and the end result was a redundant reporting system developed solely to satisfy the specific technique.

evolve as configuration elements (CE's) are identified. Eventually, all the CE's and deliverable end items must be contained somewhere in the WBS. This evolutionary phenomenon is shown in Figure 7.

A WBS, at the summary level, applied at the beginning of the program life cycle will serve as a common thread throughout the life of the program. Initially, it serves as a basis for the preparation of Requests for Proposal, specification tree, contractor responses, and contract line items. It becomes the basis for configuration management, end item identification, CIR data plans and program documentation. As the program evolves, it becomes the basis for identifying consistent reporting categories and for tracking actual performance against the plan.

For a WBS to be responsive to all of the reporting requirements for a given program, the designated reporting structure must be developed in such a way that it can accommodate the way the Air Force contracts for and manages the program. This can be accomplished where contract line items are structured in such a way that they represent natural aggregations of deliverable contract end items. These are the same end items for which performance specifications are written and against which schedules are developed and costs are monitored.

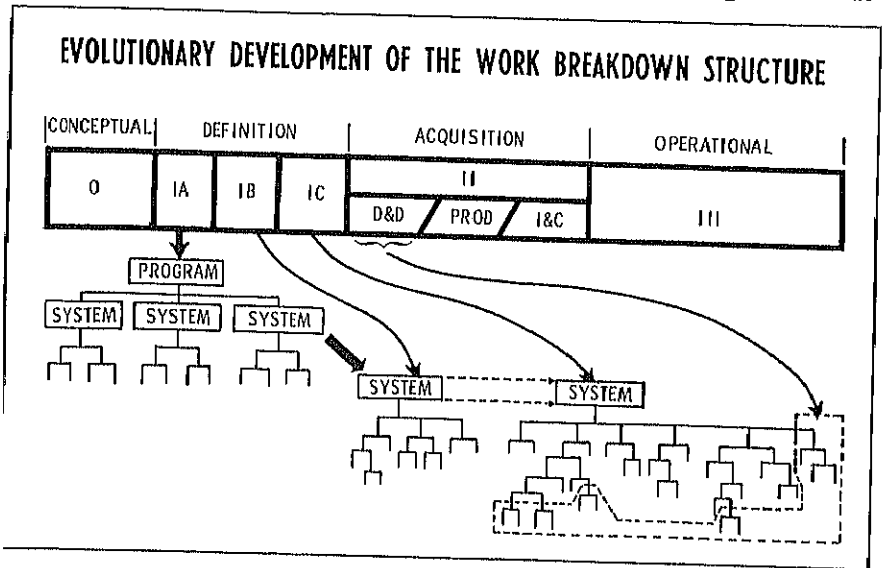


Figure 7.

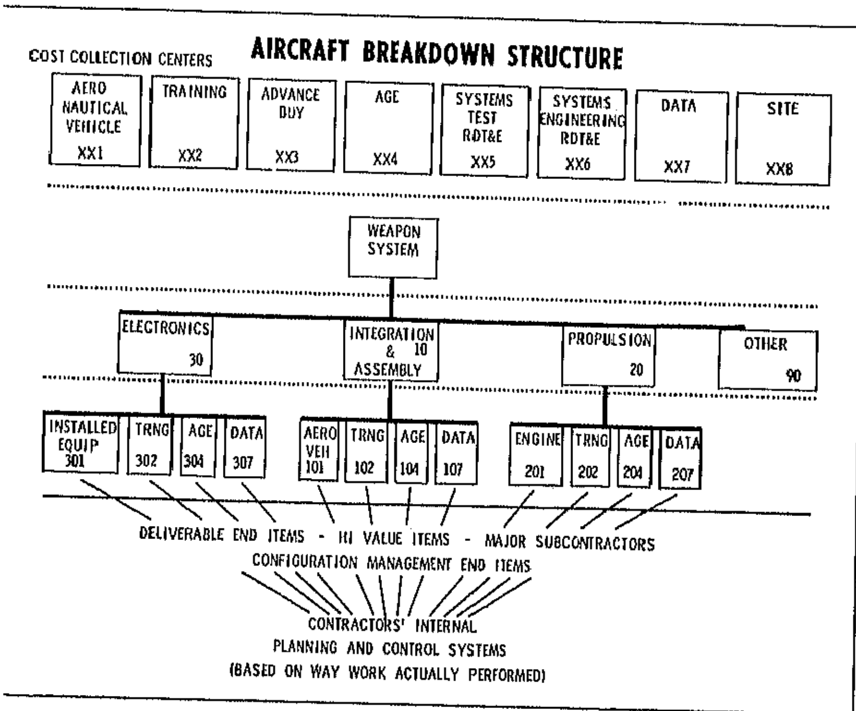


Figure 8.

AFSC is currently preparing a manual standardizing the preparation of work statements which requires just such a correlation. Contract definition procedures also support this kind of an approach. Moreover, several Air Force projects are already following this approach so that the feasibility has been demonstrated.

Much of the confusion surrounding the development of WBS's is caused by rigid application of "total system" structures for each contract in a program. This is not the way we manage our business, however. An example of the current CIR WBS for aircraft is as follows:

Total Aircraft System:

- Air Vehicle
  - Airframe
  - Propulsion
    - Engine
  - Navigation-Electronic System
- Aerospace Ground Equipment
- Training
- Data
- Etc.

In actual cases, the Air Force contracts with a prime contractor to build the air vehicle. Historically, contracts are written separately for propulsion. Normally, we also contract separately for many electronics subsystems (navigation, communications, fire control, reconnaissance, etc.) and each of these separate contracts include appropriate aerospace ground equipment, training and data requirements. It should be quite obvious that the CIR WBS, developed to satisfy total system cost analysis purposes, must be modified somewhat if it is to be responsive to the SPO's total responsibility in managing the program. This can be effectively done, however, by a logical arrangement of the total program structure and some uniformity in identifying contract line items of the many contracts.

A simple coding arrangement provides a way of summarizing total program costs, broken out by selected categories. Schedule and technical information can be related in the same way.

Figure 8 represents an aircraft

For various reasons reports generally were not tied into the contractor's actual operating systems. Consequently, the reports, generated solely to satisfy Government reporting requirements, did not really reflect the true status of the program being reported on.

We have now come to realize that any valid measurement of contractor performance must derive directly from the contractor's internal planning and control system. Further, where valid planning and control systems exist, we should use them and not try to impose another system on top of them. The evolution of this approach is shown in Figure 5.

The Air Force approach to a solution of this problem is to stop imposing rigid techniques and, instead, to outline the basic criteria which a contractor's internal planning and control system must meet to satisfy our requirements. These criteria, which are based on the way a well managed contractor conducts his business, are embodied in a specification. The major point here is that the contractor is being given the basic criteria that his internal system must meet, and not the mechanical detail of an externally designed and rigidly imposed system.

Since many management functions must be served by information derived from a contractor's management control system, and a contractor's flexibility in deciding how most effectively to manage his activities is to be preserved, a specification approach is considered essential. In general, the specification requires that the contractor operate one integrated planning and control system to support both his internal management of the program and for reporting cost and schedule information to the Government. This information can then be progressively summarized for higher levels of management. A joint evaluation team assures the mutual understanding and acceptance of the system in meeting the needs of both contractor and Air Force management.

We think that this is a practical approach and, as a matter of fact, have several major contractors currently operating under this concept.

Integrated Work Breakdown Structure (WBS).

A planning and control system meeting the Air Force specification will be based on an integrated work breakdown structure (WBS) which provides the framework within which the work required to accomplish contract objectives is identified and scheduled, and within which the cost of this work is planned and controlled.

As shown on Figure 6, the upper levels of the WBS are provided by the Air Force and constitute the structure for summary reporting of cost, schedule and related technical information to the Government. Further expansion of the WBS below the specified reporting level is the responsibility of the contractor. A general guideline to follow here is that the WBS must reflect the way in which the work is accomplished.

The lower levels of the WBS will vary from project to project depending on the contractor's organization, design complexity, technical risk, configuration management aspects, reprocurement requirements, etc.

The Office of the Director of Defense Research and Engineering (DDR&E) is currently engaged in a project to develop uniform work breakdown structures, at the summary level. By limiting the selection of uniform elements of the WBS to the upper levels (the top three) and specifying guidelines for extension below this point, uniform summary structures essential for management reporting and decision making are provided. At the same time flexibility of the content of the lower levels, required to accommodate varying contractor operations, is preserved.

One point not clearly understood by many is that the complete WBS does not automatically emerge at the beginning of the program. Its development evolves through the definition phase, or its equivalent, and normally is not totally defined until well into the development phase. WBS elements will

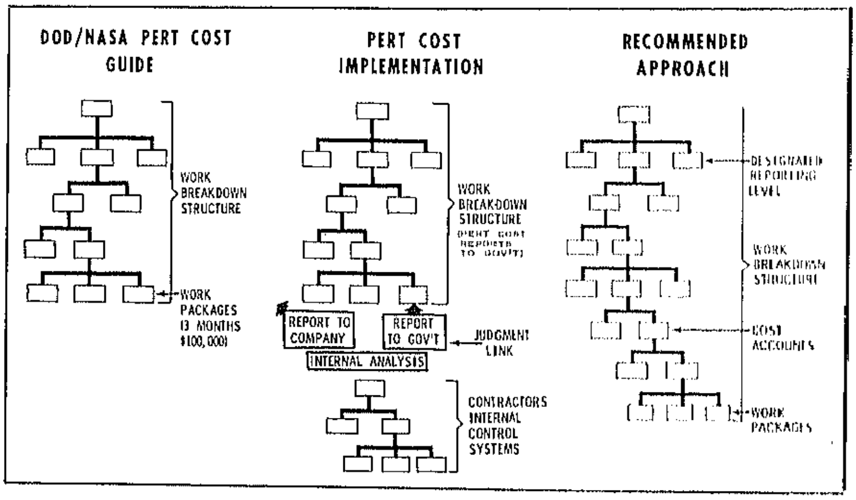


Figure 5.

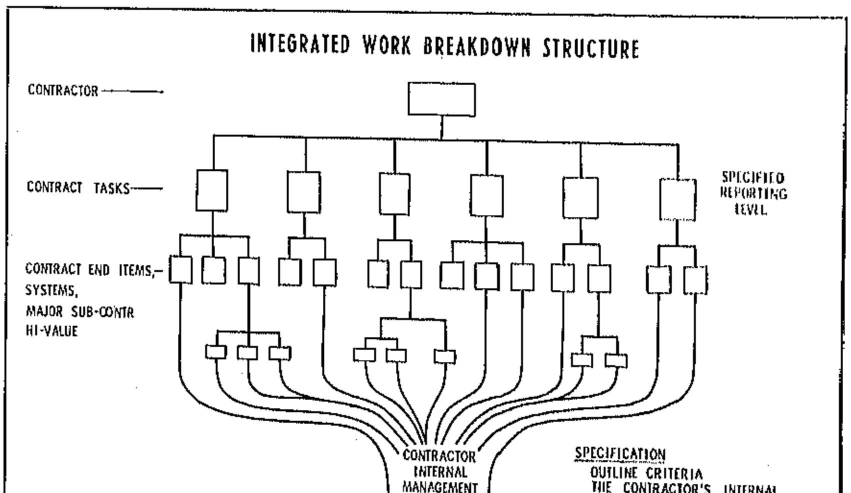


Figure 6.

(CE's) are identified. Eventually, all the CE's and deliverable end items must be contained somewhere in the WBS. This evolutionary phenomenon is shown in Figure 7.

A WBS, at the summary level, applied at the beginning of the program life cycle will serve as a common thread throughout the life of the program. Initially, it serves as a basis for the preparation of Requests for Proposal, specification tree, contractor responses, and contract line items. It becomes the basis for configuration management, end item identification, cost data plans and program documentation. As the program evolves, it becomes the basis for identifying consistent reporting categories and for tracking actual performance against the plan.

For a WBS to be responsive to all of the reporting requirements for a given program, the designated reporting structure must be developed in such a way that it can accommodate the way the Air Force contracts for and manages the program. This can be accomplished where contract line items are structured in such a way that they represent natural aggregations of deliverable contract end items. These are the same end items for which performance specifications are written and against which schedules are developed and costs are monitored.

AFSC is currently preparing a manual standardizing the preparation of work statements which requires just such a correlation. Contract definition procedures also support this kind of an approach. Moreover, several Air Force projects are already following this approach so that the feasibility has been demonstrated.

Much of the confusion surrounding the development of WBS's is caused by rigid application of "total system" structures for each contract in a program. This is not the way we manage our business, however. An example of the current CIR WBS for aircraft is as follows:

Total Aircraft System:

- Air Vehicle
  - Airframe
  - Propulsion
    - Engine
  - Navigation-Electronic System
- Aerospace Ground Equipment
- Training
- Data
- Etc.

In actual cases, the Air Force contracts with a prime contractor to build the air vehicle. Historically, contracts are written separately for propulsion. Normally, we also contract separately for many electronics subsystems (navigation, communications, fire control, reconnaissance, etc.) and each of these separate contracts include appropriate aerospace ground equipment, training and data requirements. It should be quite obvious that the CIR WBS, developed to satisfy total system cost analysis purposes, must be modified somewhat if it is to be responsive to the SPO's total responsibility in managing the program. This can be effectively done, however, by a logical arrangement of the total program structure and some uniformity in identifying contract line items of the many contracts.

A simple coding arrangement provides a way of summarizing total program costs, broken out by selected categories. Schedule and technical information can be related in the same way.

Figure 8 represents an aircraft

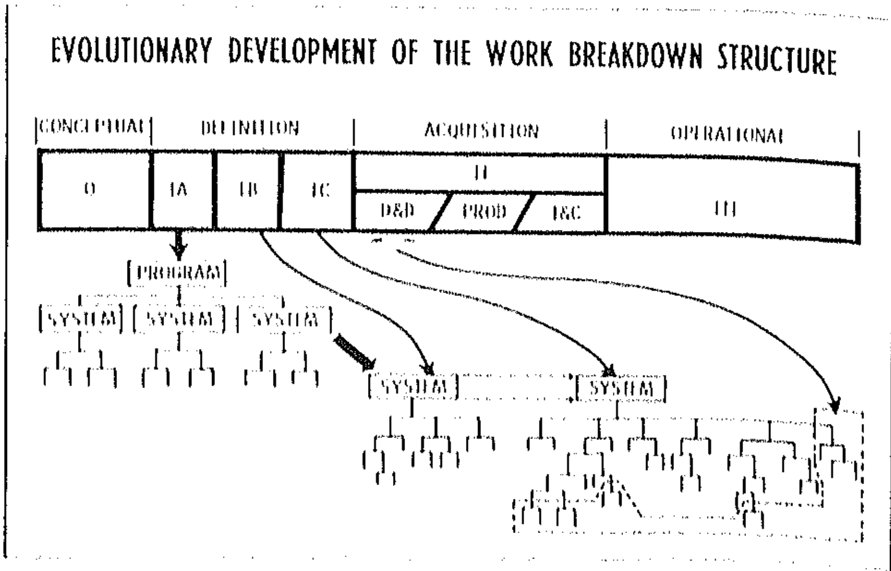


Figure 7.

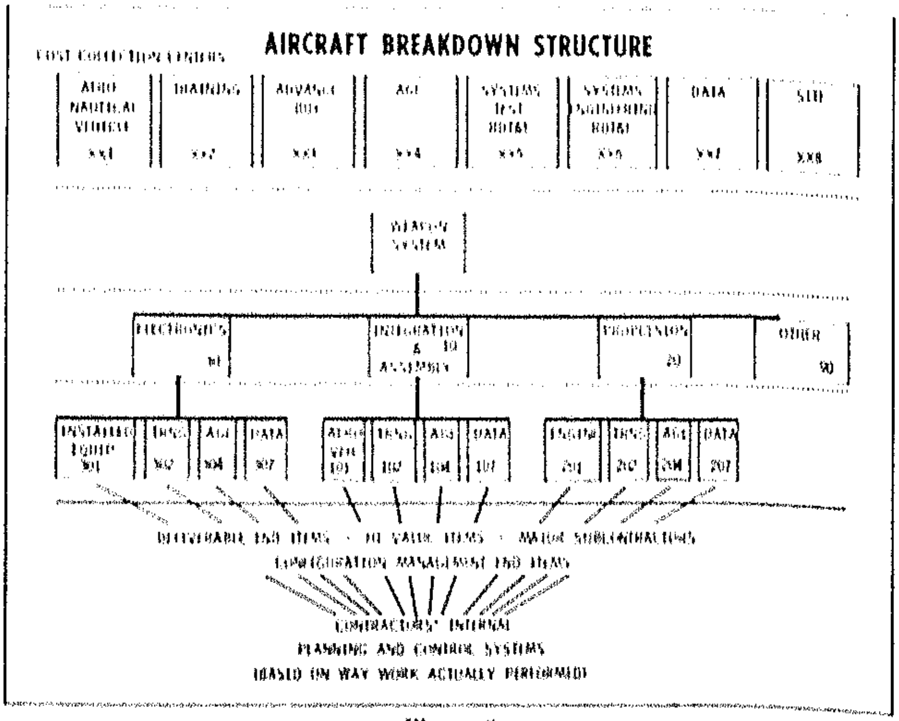
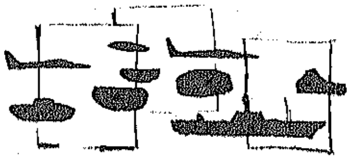


Figure 8.



DEFENSE PROCUREMENT

Contracts of $1,000,000 and over awarded during the month of December 1966:

DEFENSE SUPPLY AGENCY

2 Neptune Garment Co., Boston, Mass. $1,188,810. 27,000 men's wool gabardine overcoats. Defense Personnel Support Center, Philadelphia, Pa.

American Tent & Canvas, Inc., Lafollette, Tenn. $2,696,220. 6,000 large general purpose tents. Defense Personnel Support Center, Philadelphia, Pa.

Gentex Corp., Carbondale, Pa. $2,374,970. 27,632 combat vehicle crewmen's helmets. Defense Personnel Support Center, Philadelphia, Pa.

Columbus Mills, Columbus, Ga. $1,036,473. 1,729,000 sq. yds of non-metallic insect screening. Defense Personnel Support Center, Philadelphia, Pa.

6 The Defense Fuel Supply Center, Alexandria, Va., has awarded the following contracts for JP-4 jet fuel:

Standard Oil Co. of Calif., San Francisco, Calif. $21,226,220. 204,051,000 gals.

Humble Oil & Refining Co., Houston, Tex. $21,219,700. 229,000,000 gals.

Texaco Export, Inc., New York City, N.Y. $16,091,880. 126,000,000 gals.

Mobil Oil Corp., New York City, N.Y. $14,662,398. 161,372,860 gals.

Union Oil Co. of Calif., Los Angeles, Calif. $9,600,987. 97,146,000 gals.

Continental Oil Co., Houston, Tex. $9,317,674. 91,806,000 gals.

Sinclair Refining Co., New York City, N.Y. $8,390,760. 84,000,000 gals.

American Oil Co., Chicago, Ill. $8,281,904. 86,055,000 gals.

Coastal States Petrochemical Co., Houston, Tex. $9,056,576. 76,860,768.

Ashland Oil & Refining Co., Ashland, Ky. $7,714,268. 80,101,000 gals.

Cities Service Oil Co., New York City, N.Y. $7,601,814. 80,220,000 gals.

Phillips Petroleum Co., Bartlesville, Okla. $5,098,321. 61,326,000 gals.

Gulf Oil Corp., New York City, N.Y. $4,145,400. 42,000,000 gals.

Shamrock Oil & Gas Corp., Amarillo, Tex. $3,603,064. 35,660,000 gals.

American Petrofina Co. of Texas, Dallas, Tex. $3,401,676. 30,600,000 gals.

Sunlite Refining Co., Tulsa, Okla. $3,204,340. 30,500,000 gals.

Atlantic Richfield Co., Los Angeles, Calif. $3,048,984. 29,400,000 gals.

Golden Eagle Refining Co., Los Angeles, Calif. $2,729,600. 26,000,000 gals.

Good Hope Refineries, Houston, Tex. $2,650,000. 26,500,000 gals.

Tidewater Oil Co., New York City, N.Y. $2,400,600. 22,800,000 gals.

Douglas Oil Co. of Calif., Los Angeles, Calif. $2,427,700. 22,000,000 gals.

MacMillan Ring-Free Oil Co., Los Angeles, Calif. $2,169,000. 20,000,000 gals.

Triangle Refineries, Houston, Tex. $2,030,052. 18,480,000 gals.

Fletcher Oil & Refining Co., Wilmington, Calif. $1,869,400. 18,000,000 gals.

Golden Eagle Refining Co., Los Angeles, Calif. $1,662,300. 15,000,000 gals.

Hess Oil & Chemical Co., Perth Amboy, N.J. $1,580,000. 16,000,000 gals.

Signal Oil & Gas Co., Houston, Tex. $1,542,240. 16,120,000 gals.

Marathon Oil Co., New York City, N.Y. $1,477,098. 16,960,000 gals.

Sunray DX Oil Co., Tulsa, Okla. $1,453,480. 15,500,000 gals.

Hercules Oil Co., San Diego, Calif. $1,421,717. 12,325,000 gals.

Mohawk Petroleum Corp., San Francisco, Calif. $1,349,460. 12,600,000 gals.

Hunt Oil Co., Dallas, Tex. $1,236,240. 13,600,000 gals.

Kerr-McGee Corp., Oklahoma City, Okla. $1,126,800. 12,000,000 gals.

MacMillan Ring-Free Oil Co., Los Angeles, Calif. $1,032,000. 10,000,000 gals.

The Defense General Supply Center, Richmond, Va., has issued the following contracts for osnaburg cotton sandbags:

Cavalier Bag Co., Lumberton, N.C. $1,756,000. 7,160,000 bags.

Dowling Bag Co., Valdosta, Ga. $1,226,400. 5,000,000 bags.

Augusta Bag & Burlap Co., Augusta, Ga. $1,272,000. 5,200,000 bags.

Continental Bag Co., Crowley, La. $1,462,379. 5,864,000 bags.

6 Valley Metallurgical Processing Co., Essex, Conn. $1,308,947. Atomized magnesium powder. Defense General Supply Center, Richmond, Va.

7 Moplatex, Inc., Sarasota, Fla. $3,428,700. 7,000 medium-size general purpose tents. Defense Personnel Support Center, Philadelphia, Pa.

8 Gulf Oil Corp., Houston, Tex. $4,686,409. 14,793,000 gallons of motor gasoline; 21,277,000 gallons of distillate fuels; and 2,661,000 gallons of residual fuels. Defense Fuel Supply Center, Alexandria, Va.

Standard Oil Co., Louisville, Ky. $2,594,142. 14,846,000 gallons of motor gasoline and 3,192,300 gallons of distillate fuels. Defense Fuel Supply Center, Alexandria, Va.

9 The Defense Personnel Support Center, Philadelphia, Pa., has awarded the following contracts for tropical combat boots:

Bata Shoe Co., Belcamp, Md. $4,546,066. 347,028 pairs.

Randolph Mfg. Co., Randolph, Mass. $3,008,400. 230,000 pairs.

International Shoe Co., St. Louis, Mo. $2,468,000. 200,000 pairs.

Safety First Shoe Co., Nashville, Tenn. $2,264,571. 192,000 pairs.

McRae Shoe Inc., Mount Gilead, N.C. $1,265,016. 98,984 pairs.

The Defense Fuel Supply Center, Alexandria, Va., has awarded the following contracts for gasoline and diesel fuel:

Cities Service Oil Co., New York City, N.Y. $2,817,231. 600,000 barrels of gasoline, Combat, Type I.

Sinclair Refining Co., New York City, N.Y. $1,317,600. 270,000 barrels of gasoline, Combat, Type I.

Hess Oil & Chemical Corp., Perth Amboy, N.J. $2,175,600. 560,000 barrels of diesel fuel, Grade DF-1.

Wales Mfg. Co., Boston, Mass. $1,846,725. 46,000 men's wool gabardine overcoats. Defense Personnel Support Center, Philadelphia, Pa.

12 Centre Mfg. Co., Centre, Ala. $1,401,804. 135,440 men's coated nylon twill raincoats. Defense Personnel Support Center, Philadelphia, Pa.

13 Bonham Mfg. Co., Bonham, Tex. $1,275,600. 300,008 cotton poplin wind-resistant coats. Defense Personnel Support Center, Philadelphia, Pa.

14 California Packing Corp., San Francisco, Calif. $1,643,532. 429,000 cases of cream style corn. Defense Personnel Support Center, Philadelphia, Pa.

Richard Wynn Enterprises, Knoxville, Tenn. $1,389,733. 285,950 cotton poplin, wind-resistant men's coats. Defense Personnel Support Center, Philadelphia, Pa.

16 Magline, Inc., Pinconning, Mich. $2,020,142. 6,196 section frames for maintenance tents. Defense Personnel Support Center, Philadelphia, Pa.

Sierra Engineering Co., Sierra Madre, Calif. $1,283,865. 15,060 combat vehicle crewman's helmets. Defense Personnel Support Center, Philadelphia, Pa.

19 Trenton Textile Engineering & Mfg. Co., Trenton, N.J. $2,543,730. 211,087 men's wet weather parkas. Defense Personnel Support Center, Philadelphia, Pa.

20 Stromberg-Carlson Corp., Ardmore, Okla. $3,666,000. 15,600 small general purpose tents. Defense Personnel Support Center, Philadelphia, Pa.

21 Sands Fashions, Brooklyn, N.Y. $1,401,140. 34,000 men's wool gabardine overcoats with removeable liner. Defense Personnel Support Center, Philadelphia, Pa.

22 Delta Petroleum Co., New Orleans, La. $2,052,802. 4,825,495 gallons of lubricating oils. Defense Fuel Supply Center, Alexandria, Va.

Paulis Silk Co., Central Falls, R.I. $1,330,556. 308,508 packages of cotton elastic bandages. Defense Personnel Support Center, Philadelphia, Pa.

23 Valley Metallurgical Processing Co., Essex, Conn. $3,361,273. 4,463,700 pounds of magnesium powder. Defense General Supply Center, Richmond, Va.

Eli Lilly & Co., Indianapolis, Ind. $1,177,998. 320,856 bottles of propoxyphene hydrochloride. Defense Personnel Support Center, Philadelphia, Pa.

27 Cities Service Oil Co., New York City, N.Y. $2,034,949. 21,420,000 gallons of JP-4 jet fuel. Defense Fuel Supply Center, Alexandria, Va.

Sinclair Refining Co., New York City, N.Y. $1,474,200. 15,120,000 gallons of JP-4 jet fuel. Defense Fuel Support Center, Alexandria, Va.

Leonard Refineries, Alma, Mich. $1,011,232. 10,000,000 gallons of JP-4 jet fuel. Defense Fuel Supply Center, Alexandria, Va.

Mobil Oil Corp., New York City, N.Y. $3,609,211. Fuel oil and gasoline to be delivered to various installations in Arizona, California, Nevada, Oregon and Washington. Defense Fuel Supply Center, Alexandria, Va.

28 Rubber Fabricators, Grantsville, W. Va. $2,418,880. 302,360 pneumatic mattresses. Defense Personnel Support Center, Philadelphia, Pa.

Delta Mfg. Co., Conasauga, Tenn. $1,028,405. 6,500 tent liners. Defense Personnel Support Center, Philadelphia, Pa.

Pioneer Bag Co., Kansas City, Mo. $2,471,000. 10,000,000 polypropylene sandbags. Defense General Supply Center, Richmond, Va.

Chase Bag Co., New York City, N.Y. $1,230,300. 5,000,000 polyprophylene sandbags. Defense General Supply Center, Richmond, Va.

29 Stauffer Chemical Co., New York City, N.Y. $1,180,670. 287,501 gallons of aircraft turbine engine lubricating oil. Defense Fuel Supply Center, Alexandria, Va.

Royal Lubricants Co., Hanover, N.J. $1,000,000. 287,501 gallons of aircraft turbine engine lubricating oil. Defense Fuel Supply Center, Alexandria, Va.

Otis Elevator Co., Cleveland, Ohio. $1,072,377. 231 gasoline-powered fork lift trucks. Defense General Supply Center, Richmond, Va.

ARMY

1 Guy H. James Construction Co., Oklahoma City, Okla. $2,223,516. Work on the Keystone Project on the Arkansas River. Engineer Dist., Tulsa, Okla.

Frankford Arsenal, Philadelphia, Pa., has awarded the following contracts for metal parts for 20mm cartridges:

Gallon Amco, Galion, Ohio. $1,901,606; Supreme Products Corp., Chicago, Ill. $2,411,475; Newal, Inc., Waltham, Mass. $1,176,100; Z-D Products, El Segundo, Calif. $3,623,000.

2 Quiller Construction Co., Los Angeles, Calif. $1,566,400. Construction of a 24-bed Army Hospital at Fort Irwin, Barstow, Calif. Engineer Dist., Los Angeles, Calif.

Kollsman Instrument Corp., Elmhurst, N.Y. $2,142,000. Booster assemblies and metal parts for 75 and 155mm shells. Bridgeport, Conn. Procurement Detachment, New York City, N.Y.

General Time Corp., LaSalle, Ill. $3,006,750. Fuzes for 105mm projectiles. LaSalle. Frankford Arsenal, Philadelphia, Pa.

CONTRACT LEGEND

Contract information is listed in the following sequence: Date—Company—Value—Material or work to be Performed—Location of Work Performed—Contracting Agency.

—Eureka Williams Co., Bloomington, Ill. $1,964,539. Metal parts for mechanical time fuzes. Bloomington. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Liles Construction Co., Montgomery, Ala. $3,248,299. Rehabilitation of barracks and facilities at Fort Polk, La. Engineer Dist., Fort Worth, Tex.

5—Federal Laboratories, Saltsburg, Pa. $1,453,332. Hand grenades. Saltsburg. Edgewood Arsenal, Md.
—General Time Corp., LaSalle, Ill. $1,242,331. 2.75-inch rocket fuzes. LaSalle. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Harvey Aluminum, Torrance, Calif. $4,524,240. 20mm cartridge components. Torrance. Frankford Arsenal, Philadelphia, Pa.
—Mohawk Rubber Co., Akron, Ohio. $2,455,671. Pneumatic tires for 1½-ton, 5-ton and 12-ton vehicles. Akron. Army Tank Automotive Center, Warren, Mich.
—Mansfield Tire & Rubber Co., Mansfield, Ohio. $1,417,758. Pnuematic tires for 1½-ton, 5-ton and 12-ton vehicles. Mansfield. Army Tank Automotive Center, Warren, Mich.

6—Soule Construction Co., Pensacola, Fla. $1,665,693. Work on the Cross Florida Barge Canal Project. Eureka, Fla. Engineer Dist., Jacksonville, Fla.
—Harvey Aluminum Sales, Torrance, Calif. $3,171,439. Classified items. Milan, Tenn. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Bell Aerospace Corp., Fort Worth, Tex. $2,417,184. Door assemblies for UH-1 aircraft. Fort Worth. Army Aviation Materiel Command, St. Louis, Mo.

8—Firestone Tire & Rubber Co., Akron, Ohio. $1,117,377. Shoe assemblies for armored personnel carriers. Noblesville, Ind. Army Tank Automotive Center, Warren, Mich.
—Ford Motors, Dearborn, Mich. $4,965,235. ½-ton utility trucks. Highland Park, Mich. General Purpose Vehicle Project Manager, Warren, Mich.

9—Goodyear Tire & Rubber Co., Akron, Ohio. $1,361,108. 10,000-gallon capacity collapsible fabric tank assemblies for petroleum. Litchfield Park, Ariz. Army Mobility Equipment Command, St. Louis, Mo.
—Studebaker Corp., Minneapolis, Minn. $1,620,215. Generator sets. Minneapolis. Army Mobility Equipment Command, St. Louis, Mo.
—Firestone Tire & Rubber Co., Akron, Ohio. $4,231,854. Shoe assemblies for tank recovery vehicles. Noblesville, Ind. Tank Automotive Center, Warren, Mich.
—Grumman Aircraft Engineering Corp., Bethpage, N.Y. $2,007,500. OV-1C (Mohawk) aircraft related data reports and ground support equipment. Bethpage. Army Aviation Materiel Command, St. Louis, Mo.
—Mine Safety Appliances Co., Pittsburgh, Pa. $28,926,540. M17A1 field masks. Esmond, R.I. Edgewood Arsenal, Md.
—General Tire & Rubber Co., Akron, Ohio. $1,346,307. Assembly of 750-pound bomb body parts, and fin assemblies for 1,000-pound bombs. Muncie, Ind. Ammunition Procurement & Supply Agency, Joliet, Ill.
—General Dynamics, Rochester, N.Y. $2,594,312. Radio teletypewriter sets. Rochester. Army Electronics Command, Philadelphia, Pa.

12—Standard Container Co., Montclair, N.J. $2,774,250. M2A1 ammunition boxes. Homerville, Ga. Frankford Arsenal, Philadelphia, Pa.
—Harvey Aluminum, Inc., Torrance, Calif. $3,973,900. 20mm target practice projectiles. Torrance. Frankford Arsenal, Philadelphia, Pa.
—Baifield Industries, Carrolton, Tex. $2,950,145. Bomb dispensers, shipping and storage containers. Carrolton. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Continental Motors, Muskegon, Mich. $5,374,131. Standard military engines. Milwaukee, Wis. Mobility Equipment Command, St. Louis, Mo.
—General Electric, Burlington, Vt. $1,626,650. 7.62mm aircraft machine guns and components. Burlington. Army Weapons Command, Rock Island, Ill.
—International Terminal Operating Co., New York City, N.Y. $8,895,787. Stevedoring services. Bayonne, N.J. Procurement Office, Eastern Area, Military Traffic Management and Terminal Service, Brooklyn, N.Y.

13—Northrop-Carolina, Inc., Asheville, N.C. $2,440,971. Riot hand grenades. Buncombe City, N.C. Edgewood Arsenal, Md.

—General Motors, Detroit, Mich. $1,827,476. Diesel engines, six cylinder, V-type, 210-horsepower, for the Personnel Carrier Tank Recovery Vehicle and Hawk Loader. Detroit. Army Tank Automotive Center, Warren, Mich.

14—General Motors, Detroit, Mich. $2,046,904. Work on Phase III Development of the U.S.-F.R.G. Main Battle Tank Project. Warren, Mich. Army Tank Automotive Center, Warren, Mich.
—Penland Paper Converting Corp., Hanover, Pa. $2,046,000. Fiber ammunition containers for 105mm shells. Hanover. Ammunition Procurement & Supply Agency, Joliet, Ill.
—United Ammunition Container, Inc., Philadelphia, Pa. $1,077,250. Fiber ammunition containers for 155mm shells. Philadelphia. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Pace Corp., Memphis, Tenn. $1,756,785. Flares. Camden, Ark. Ammunition Procurement & Supply Agency, Joliet, Ill.
—AVCO Corp., Richmond, Ind. $1,912,296. Fuzes for 2.75-inch rockets. Richmond. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Canadian Commercial Corp., Ottawa, Canada. $2,909,535. Utility helicopter engines. Longueuil, Quebec. Army Aviation Materiel Command, St. Louis, Mo.
—Motorola, Inc., Chicago, Ill. $2,466,000. Metal parts for artillery ammunition shells. Elk Grove Village, Ill. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Raymond Engineering Laboratories, Middleton, Conn. $2,759,392. Fabrication of assemblies for rocket proximity fuzes. Middleton. Harry Diamond Laboratory, Washington, D.C.

15—Norris Industries, Vernon, Calif. $4,068,113. Metal canisters for mine systems. Brockton, Mass. and Vernon, Calif. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Martin Marietta Corp., Orlando, Fla. $2,067,999. Metal canisters for mine systems. Orlando. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Catalyst Research Corp., Baltimore, Md. $1,342,671. Fabrication of power supplies for rocket proximity fuzes. Baltimore. Harry Diamond Laboratory, Washington, D.C.
—Goodyear Tire & Rubber Co., Akron, Ohio. $1,651,125. Pneumatic tires for trucks and trailers. Akron. Army Tank Automotive Center, Warren, Mich.

16—Norris Industries, Los Angeles, Calif. $12,863,086. 105mm cartridge cases. Riverbank, Calif. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Sperry Rand Corp., New York City, N.Y. $6,293,098. Ammunition, components for ammunition and for operation and maintenance activities at Louisiana Army Ammunition Plant, Shreveport, La. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Holston Defense Corp., Kingsport, Tenn. $19,134,368. Explosives. Kingsport. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Stone Container Corp., Chicago, Ill. $1,081,125. Fiber containers for 105mm ammunition. Chicago. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Martin Marietta, Orlando, Fla. $1,050,765. Components for mines and for loading of mine systems. Orlando. Ammunition Procurement & Supply Agency, Joliet, Ill.
—AVCO Corp., Stratford, Conn. $1,318,049. Technical publication in support of T53 and T55 aircraft engines. Stratford. Army Aviation Materiel Command, St. Louis, Mo.
—Grumman Aircraft Engineering Corp., Bethpage, L.I., N.Y. $9,427,102. OV-1 aircraft, related testing, data, ground support equipment, publications and long lead time for the second increment period. Bethpage and Stuart, Fla. Army Aviation Materiel Command, St. Louis, Mo.
—Philco Ford Corp., Newport Beach, Calif. $1,209,983. Repair parts for the M75 grenade launcher used on UH-1B helicopters. Newport Beach. Army Weapons Command, Rock Island, Ill.

19—Continental Motors, Muskegon, Mich. $6,409,020. 1½, 3 and 6 horse power engines. Milwaukee, Wis. Army Mobility Equipment Command, St. Louis, Mo.
—General Instrument Corp., Hicksville, N.Y. $1,500,000. Classified electronic equipment. Hicksville. Army Electronics Command, Fort Monmouth, N.J.
—General Motors, Cleveland, Ohio. $2,514,375. Conversion kits to accomodate the 20mm rapid fire weapons system to the M114A1 vehicle. Cleveland. Army Weapons Command, Rock Island, Ill.
—Zeller Corp., Defiance, Ohio. $3,370,932. Metal parts for 20mm projectiles. Defiance. Frankford Arsenal, Philadelphia, Pa.
—Canadian Commercial Corp., Ottawa, Canada. $1,150,609. Ammunition propellant. Montreal, Canada. Frankford Arsenal, Philadelphia, Pa.
—Polarad Electronics Corp., Long Island City, N.Y. $1,660,974. Signal generators and maintenance support items for radio sets. Long Island City. Army Electronics Command, Philadelphia, Pa.

20—American Hoist & Derrick Co., St. Paul, Minn. $11,076,371. 20 ton wheel mounted cranes. Fort Wayne, Ind. Army Mobility Equipment Command, St. Louis, Mo.
—National Union Electric, Bloomington, Ill. $4,112,500. Bomb components and assemblies. Bloomington. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Redmanson Corp., York, Pa. $1,203,208. Air conditioners of carbon steel. York. Army Mobility Equipment Command, St. Louis, Mo.
—Bendix Corp., Teterboro, N.J. $1,071,265. NH-1 altitude indicators for multiple aircraft. Teterboro. Army Aviation Command, St. Louis, Mo.
—Automatic Electronic Co., North Lake, Ill. $1,100,697. Items to be used for Autovon PABX equipment. North Lake. Army Electronics Command, Fort Monmouth, N.J.
—Page Communications Engineers, Washington, D.C. $2,054,770. Micro wave interconnect links within the Integrated Wide Band Communications System, Southeast Asia. Army Electronics Command, Fort Monmouth, N.J.

21—City of Jacksonville, Fla. $1,200,000. Purchase of one used floating power plant. Engineer Dist., Jacksonville, Fla.
—Mike Bradford & Co., Miami, Fla. $1,180,426. Work on the J. Percy Priest Dam & Reservoir, Davidson County, Tenn. Engineer Dist., Nashville, Tenn.
—AVCO Corp., Stratford, Conn. $9,110,200. T-55 engines. Stratford. Army Aviation Materiel Command, St. Louis, Mo.
—Continental Motors, Muskegon, Mich. $3,784,260. LD 465 1 multi-fuel engines as spare parts for 2½ ton trucks. Muskegon. General Purpose Vehicle Project Manager, Warren, Mich.

22—Delaware Valley Armament, Inc., Cherry Hill, N.J. $2,545,000. Metal parts assemblies for artillery ammunition. Cherry Hill. Procurement Detachment, New York City, N.Y.
—Brad's Machine Products, Inc., Gadsden, Ala. $2,700,000. Metal parts assemblies for artillery ammunition. Gadsden. Procurement Detachment, New York City, N.Y.
—Lear Siegler, Inc., Anaheim, Calif. $2,080,000. Metal parts assemblies for artillery ammunition. Anaheim. Procurement Detachment, New York City, N.Y.
—L. T. Industries, Dallas, Tex. $1,400,280. Fin assemblies for the 750-lb. bomb. Garland, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.
—R. G. LeTourneau, Longview, Tex. $1,559,307. Fin assemblies for the 750-lb. bomb. Longview. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Floron Products, New Rochelle, N.Y. $1,590,445. Fin assemblies for the 750-lb. bomb. Scranton, Pa. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Dynamics Corporation of America, Garden City, N.Y. $1,016,681. Fabrication of electronics heads for M414A1 rocket fuzes. Garden City. Harry Diamond Laboratories, Washington, D.C.
—Kaiser Jeep Corp., Toledo, Ohio. $2,169,870. Partial assembly kits for one-ton cargo trucks. Toledo. Army Tank Automotive Center, Warren, Mich.
—Pacific Car & Foundry, Renton, Wash. $3,340,810. XM-733 modified assault vehicles. Renton. Army Tank Automotive Center, Warren, Mich.
—Pacific Car & Foundry, Renton, Wash. $1,008,470. 40-ton railway refrigerator cars. Renton. Army Mobility Equipment Command, St. Louis, Mo.
—Pettibone-Mulliken Corp., Washington, D.C. $3,094,000. Fork-lift trucks. Chicago, Ill. Army Mobility Equipment Command, St. Louis, Mo.
—RCA, Camden, N.J. $5,000,000. Classified electronics equipment. Camden. Army Electronics Command, Fort Monmouth, N.J.

23—**General Motors**, Indianapolis, Ind. $4,200,-580. Transmission assemblies. Indianapolis. Army Tank Automotive Center, Warren, Mich.

—**General Motors**, Detroit, Mich. $31,040,659. Metal parts for 105mm projectiles. St. Louis. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**R. C. Can Co.** Hazelwood, Mo. $1,305,458. 105mm ammunition containers. Hazelwood. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**General Motors**, Detroit, Mich. $1,025,109. Diesel engines for 155mm howitzers. Detroit. Army Tank Automotive Center, Warren, Mich.

—**Akwa-Downey Construction Co.**, Milwaukee, Wis. $6,592,295. Work on a vehicle assembly building at Kennedy Space Center, Merrett Island, Fla. Canaveral Engineer Dist., Merritt Island, Fla.

—**Levinson Steel Co.**, Pittsburgh, Pa. $3,860,-025. Metal parts for 105mm projectiles. Hays, Pa. Ammunition Procurement & Supply Agency, Joliet, Ill.

27—**Odom Construction Co.**, Nashville, Tenn. $2,931,818. Work on Kentucky Highway No. 15 at the Carr Fork Reservoir Project, Hazard, Ky. Engineer Dist., Louisville, Ky.

—**Colt's Inc.**, Hartford, Conn. $6,908,750. XM16E1 and M16 rifles (5.56mm). Hartford. Army Weapons Command, Rock Island, Ill.

—**Cessna Aircraft Co.**, Wichita, Kan. $3,156,-896. Bombs with dispensers and shipping and storage containers. Wichita. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Technical Operations, Inc.**, Burlington Mass. $2,361,400. 1,190 man months of scientific and technical effort in support of studies, analysis and evaluations for the Combat Development Command, Fort Belvoir, Va. Fort Belvoir. Northwest Procurement Agency, Oakland, Calif.

28—**Arvin Industries**, Columbus, Ind. $1,042,781. Radio sets. Columbus. Army Electronics Command, Philadelphia, Pa.

—**Continental Motors**, Muskegon, Mich. $1,-012,037. Multi-fuel engines for 5-ton trucks. Muskegon. Project Manager, General Purpose Vehicles, Warren, Mich.

—**Cessna Aircraft Co.**, Wichita, Kan. $1,262,-761. Bomb dispensers and containers for dispenser equipment. Wichita. Procurement Detachment, Chicago, Ill.

—**Remington Arms Co.**, Bridgeport, Conn. $40,299,208. Miscellaneous small arms ammunition. Independence, Mo. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Day & Zimmerman, Inc.**, Philadelphia, Pa. $4,241,562. Miscellaneous ammunition components. Texarkana, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Thiokol Chemical Corp.**, Bristol, Pa. $22,-981,808. Assembling, loading and packing of ordnance items. Marshall, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Harvey Aluminum Sales**, Torrance, Calif. $3,147,406. Loading, assembling and packing of miscellaneous medium caliber ammunition and components. Milan, Tenn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Federal Cartridge Corp.**, Minneapolis, Minn. $7,862,411. Production of 7.62mm ball ammunition and for operation and maintenance activities. Minneapolis. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Airport Machining Corp.**, Martin, Tenn. $1,803,730. Metal parts for 2.75-inch rockets. Union City, Tenn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**American Mfg. Co. of Tex.**, Fort Worth, Tex. $1,072,000. Components for 2.75-inch rockets. Fort Worth. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Polan Industries**, Huntington, W. Va. $1,-236,082. Periscopes. Huntington. Frankford Arsenal, Philadelphia, Pa.

29—**Honeywell, Inc.**, Hopkins, Minn. $3,265,252. Fuzes. New Brighton, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**UMC Industrials, Inc.**, Goodyear, Ariz. $1,038,960. Smoke grenades. Goodyear. Edgewood Arsenal, Md.

—**Texas Instrument, Inc.**, Dallas, Tex. $7,-000,000. Classified electronic equipment. Dallas. Army Electronics Command, Fort Monmouth, N.J.

—**Anthony Co.**, Streator, Ill. $4,090,331. 160 diesel engine driven, fork lift trucks. Streater. Army Mobility Equipment Command, St. Louis, Mo.

30—**Hamilton Watch Co.**, Lancaster, Pa. $5,-106,443. 105mm cartridge fuzes. Lancaster, Frankford Arsenal, Philadelphia, Pa.

—**Martin Marietta**, Orlando, Fla. $5,139,909. Continuation of industrial engineering support for the Pershing weapon system. Orlando. Army Missile Command, Redstone Arsenal, Huntsville, Ala.

—**Raytheon Co.**, Norwood, Mass. $2,222,000. 408 telephone signal converters with repair parts and 400 telephone signal converters, less chassis and with a different cable assembly, and with concurrent repair parts and ancillary items. North Dighton, Mass. Army Electronics Command, Philadelphia, Pa.

—**Packard Bell Electronics Corp.**, Newbury Park, Calif. $1,553,000. 472 transponder test sets. Newbury Park. Southwest Procurement Agency, Pasadena, Calif.

—**Fairchild Hiller Corp.**, Hagerstown, Md. $3,412,836. Transmissions for H-23 helicopters. Hagerstown. Army Aviation Materiel Command, St. Louis, Mo.

—**LTV Electro Systems**, Greenville, S.C. $1,-597,100. Development, prototyping and manufacturing of modification kits for an Avionics Retrofit Project for U-1, 6 and 8 fixed-wing aircraft. Greenville. Army Aviation Materiel Command, St. Louis, Mo.

—**United Aircraft, Pratt & Whitney Div.**, East Hartford, Conn. $3,054,009. Engine generators for CH-54A aircraft. East Hartford. Army Aviation Materiel Command, St. Louis, Mo.

—**United Aircraft, Sikorsky Div.**, Stratford, Conn. $1,617,099. CH-54A transmission assemblies and main rotor assemblies. Stratford. Army Aviation Materiel Command, St. Louis, Mo.

—**United Aircraft, Hamilton Standard Div.**, Windsor Locks, Conn. $1,648,288. Propellers for OV-1 Mohawk aircraft. $2,653,-530. OV 1 propeller controls. Windsor Locks. Army Aviation Materiel Command, St. Louis, Mo.

—**National Gypsum Co.**, Buffalo, N.Y. $16,-844,000. Reactivation of facilities for production of ordnance items at the Kansas Army Ammunition Plant, Parsons, Kan. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Bulova Watch Co.**, Jackson Heights, N.Y. $1,120,600. Fuzes for the 81mm mortar. Jackson Heights. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Stewart-Warner Corp.**, Chicago, Ill. $1,022,058. Mine fuzes. Chicago. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Farmer's Chemical Associates, Inc.**, Tyner, Tenn. $1,468,781. Support services for the manufacture of explosives. Chattanooga, Tenn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**General Motors**, Detroit, Mich. $1,370,000. Reactivation of support utilities at the Army Ammunition Plant, St. Louis, Mo. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Hercules, Inc.**, Wilmington, Del. $4,537,763. Miscellaneous propellants and explosives, and for operation and maintenance activities at the Army Ammunition Plant, Radford, Va. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Chamberlain Corp.**, Scranton, Pa. $5,020,-628. 175mm projectiles. Army Ammunition Plant, Scranton, Pa. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Atlantic Research Corp.**, Alexandria, Va. $1,634,380. Metal parts for mine canisters. Alexandria. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Donovan Construction Co.**, St. Paul, Minn. $7,918,125. Metal parts for 155mm projectiles. St. Paul. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**General Motors**, Detroit, Mich. $6,527,092. 4,400 four-door, six-passenger, commercial sedans. Wilmington, Del. Army Tank Automotive Center, Warren, Mich.

—**General Motors**, Detroit, Mich. $1,830,720 1,028 commercial station wagons. Detroit. Army Tank Automotive Center, Warren, Mich.

NAVY

1—**Vocaline Company of America**, Old Saybrook, Conn. $1,093,346. Work on preproduction, production and engineering testing for quality control of sonobuoys and underwater sound signals. South Bristol, Maine. Naval Air Systems Command.

—**Lockheed Aircraft Corp.**, Burbank, Calif. $1,951,500. Modification of government owned SP-2H aircraft. Burbank. Naval Air Systems Command.

—**Western Electric**, New York City, N.Y. $1,000,000. MK 1 Mod O weapons direction equipment. Burlington, N.C. Naval Ordnance Systems Command.

—**Skagit Corp.**, Sedro Woolley, Wash. $1,-951,630. Winches to be used aboard fast combat support ships. Puget Sound Naval Shipyard, Bremerton, Wash.

2—**Garrett Corp., AiResearch Div.**, Phoenix, Ariz. $11,626,329. T76-G-10/12 engines for OV-10A aircraft. Phoenix. Naval Air Systems Command.

—**Lockheed Aircraft Corp.**, Burbank, Calif. $7,380,000. Long leadtime effort and materials to support FY 67 procurement of P-3B aircraft. Burbank. Naval Air Systems Command.

—**Merando, Inc.**, Washington, D.C. $1,818,-300. Construction of a station hospital and dental clinic at the Naval Air Training Center, Patuxent River, Md. Chesapeake Div., Naval Facilities Engineering Command.

—**Western Electric**, New York City, N.Y. $1,051,892. Sonar equipment for submarines. Burlington, N.C. Naval Ship Systems Command.

—**North American Aviation**, Columbus, Ohio. $1,700,000. Condor missiles. Columbus. Naval Air Systems Command.

5—**United Aircraft**, East Hartford, Conn. $1,-352,000. J60-P-6 engines for aircraft. East Hartford. Naval Air Systems Command.

—**United Aircraft**, East Hartford, Conn. $1,-035,815. Model J75-P-13B engines for the Air Force. East Hartford. Naval Air Systems Command.

—**Johns Hopkins University, Applied Physics Laboratory**, Silver Spring, Md. $1,640,000. Work on the Bumblebee project. Silver Spring. Naval Ordnance Systems Command.

—**General Dynamics**, Pomona, Calif. $3,420,-000. Guidance, control and ordnance sections for Type I standard missiles. Pomona. Naval Ordnance Systems Command.

—**Monsanto Research Corp.**, St. Louis, Mo. $2,000,000. Research on high performance composite materials. St. Louis. Office of Naval Research, Washington, D.C.

6—**National Co.**, Melrose, Mass. $7,557,327. Radio transmitters for shore communications. Melrose. Navy Purchasing Office, Washington, D.C.

AAI Corp., Baltimore, Md. $2,061,341. Missile handling systems to be used aboard fast combat support ships. Cockeysville, Md. Puget Sound Naval Shipyard, Bremerton, Wash.

—**Boeing Co.**, Seattle, Wash. $1,120,000. Research on the stress corrosion cracking of high strength metals. Seattle. Office of Naval Research, Washington, D.C.

—**Hewlett-Packard Co.**, Rockville, Md. $1,-674,800. Oscilloscopes. Colorado Springs, Colo. Naval Ship Systems Command.

8—**Baldwin-Lima-Hamilton Corp.**, Philadelphia, Pa. $1,227,360.' Ship propellers. Philadelphia. Naval Ship Systems Command.

—**United Aircraft**, Norwalk, Conn. $2,037,-973. Display systems and associated equipment for submarines. Norwalk. Naval Ship Systems Command.

—**United Aircraft**, East Hartford, Conn. $1,-758,802. Overhaul equipment for J-75 aircraft engines. East Hartford. Navy Aviation Supply Office, Philadelphia, Pa.

—**Westinghouse Electric**, Pittsburgh, Pa. $5,-120,000. Navy nuclear-propulsion components. Pittsburgh. Naval Ship Systems Command.

9—**Northrop Corp.**, Newbury Park, Calif. $1,-095,815. MQM-36A aerial targets. Newbury Park. Naval Air Systems Command.

—**Bermite Powder Co.**, Saugus, Calif. $9,-965,644. Aircraft parachute flares. Saugus. Navy Ships Parts Control Center, Mechanicsburg, Pa.

12—**Martin-Marietta Corp.**, Baltimore, Md. $1,226,464. Systems engineering and avionics design for an accelerated P-2 aircraft program. Baltimore. Navy Air Development Center, Johnsville, Pa.

—**Hazeltine Corp.**, Little Neck, N.Y. $2,374,-757. Air droppable acoustic devices. Little Neck. Navy Air Development Center, Johnsville, Pa.

—**Sperry Rand Corp.**, Great Neck, N.Y. $2,309,584. Engineering effort to perform a development program on the Terrier radar set, and ancillary equipment. Great Neck. Naval Ordnance Systems Command.

—AVCO Corp., Stratford, Conn. $1,307,513. Spare parts for A4E aircraft. Stratford. Navy Aviation Supply Office, Philadelphia, Pa.

13—United Aircraft, Pratt & Whitney Aircraft Div., East Hartford, Conn. $22,404,955. J52-P-8A engines. East Hartford. Naval Air Systems Command.

—Curtis-Wright Corp., Wood-Ridge, N.J. $8,-484,601. Spare parts for aircraft engines. Wood-Ridge. Navy Aviation Supply Office, Philadelphia, Pa.

14—Willamette Iron & Steel Co., Portland, Ore. $2,431,000. Overhaul of the oiler USS Cacapon (AO-52). Portland. Industrial Manager, 13th Naval Dist.

—Newport News Shipbuilding & Drydock Co., Newport News, Va. $1,000,000. Overhaul and refueling of the ballistic missile submarine USS Lafayette (SSBN-616). Newport News. Naval Ship Systems Command.

—Aerojet General Corp., Sacramento, Calif. $2,908,456. Manufacture of Sparrow missiles. Sacramento. Naval Ordnance Stations, Indian Head, Md.

—General Dynamics, Pomona, Calif. $1,414,-800. Study program on an antisubmarine warfare ship integrated combat system. Pomona. Naval Ship Systems Command.

15—Blass Antenna Electronics Corp., Long Island City, N.Y. $1,050,000. Work on phased array radar aboard naval ships. Long Island City. Naval Ship Systems Command.

—General Dynamics, Pomona, Calif. $3,500,-000. Research and development on the Standard Arm Missile. Pomona. Naval Air Systems Command.

—Grumman Aircraft Engineering Corp., Bethpage, L.I., N.Y. $6,207,000. TC-4C aircraft. Bethpage. Naval Air Systems Command.

—Hughes Tool Co., Culver City, Calif. $3,-734,862. 20mm gun pods. Culver City. Naval Air Systems Command.

—General Electric, Schenectady, N.Y. $1,-123,000. Refurbishment of nuclear propulsion components. Schenectady, N.Y. Naval Ship Systems Command.

—J.A. Jones Construction Co., Memphis, Tenn. $3,620,000. Construction of an enlisted mens barracks at the Naval Air Station, Memphis, Tenn. Southeast Div., Naval Facilities Engineering Command.

16—Boeing Co., Morton, Pa. $7,680,000. CH-46D helicopters. Morton. Naval Air Systems Command.

—Bromfield Corp., United Shipbuilding Div., East Boston, Mass. $1,690,354. Topside repairs on the auxiliary oiler USS Allagash (AO-97). East Boston. Superviser of Shipbuildings, 1st Naval Dist.

—John Trumpy & Sons, Annapolis, Md. $5,-299,470. Construction of six Fast Patrol Boats. Annapolis. Naval Ship Systems Command.

—M.I.T., Cambridge, Mass. $2,000,000. Tactical engineering support for the Polaris guidance system. Cambridge. Special Projects Office.

—General Electric, Syracuse, N.Y. $1,207,-745. Modification of a development model of a communication system for shipboard use. Syracuse. Naval Ships Systems Command.

9—Radiation, Inc., Melbourne, Fla. $3,392,378. Digital data communication sets for Navy aircraft. Melbourne. Naval Air Systems Command.

)—United Aircraft, East Hartford, Conn. $4,-069,322. Spare parts to support turbo-jet engines used on various attack and fighter aircraft. East Hartford. Navy Aviation Supply Office, Philadelphia, Pa.

—United Aircraft, East Hartford, Conn. $3,-071,439. Spare parts to support the TF30-P8 engine used on A-7B aircraft. East Hartford. Navy Aviation Supply Office, Philadelphia, Pa.

—Curtiss Wright Corp., Wood-Ridge, N.J. $2,743,951. Spare parts for R1820 radial arrangement engines used on various aircraft. Wood-Ridge. Navy Aviation Supply Office, Philadelphia, Pa.

—General Electric, West Lynn, Mass. $2,-129,505. Spare parts for T-58 engines used in CH-46 and UH-2 aircraft. West Lynn. Navy Aviation Supply Office, Philadelphia, Pa.

—Bendix Corp., Teterboro, N.J. $1,738,060. Components of the PB20N autopilot system used on P-3A aircraft. Teterboro. Navy Aviation Supply Office, Philadelphia, Pa.

—Raytheon Co., Lexington, Mass. $1,138,753. Sparrow missiles. Lowell, Mass. Naval Air Systems Command.

—University of Alaska, College, Alaska. $1,-210,000. Services in connection with the operation of the Arctic Research Laboratory. College. Office of Naval Research.

23—Tracor, Inc., Austin, Tex. $2,732,724. Technical services and engineering assistance for the Sonar Systems Project Office of the Naval Ship Systems Command. Washington, D.C. Naval Ship Systems Command.

—Sea Land Services, Inc., Elizabeth, N.J. $7,500,000. Weekly container cargo service from the west coast to the Philippine Islands commencing April 1, 1967. Military Sea Transportation Service.

—Williams & Burrows, Belmont, Calif. $1,-152,000. Construction of an office building at the Naval Station, Treasure Island, San Francisco, Calif. Western Div., Naval Facilities Engineering Command.

—University of California, Berkeley, Calif. $1,108,000. Additional research on the epidemiology of infectious diseases. Berkeley. Office of Naval Research.

27—McDonnell Aircraft, St. Louis, Mo. $1,050,-000. Wing section assemblies for F-4B aircraft. St. Louis. Navy Aviation Supply Office, Philadelphia, Pa.

—Washington Aluminum Co., Baltimore, Md. $3,670,081. AM2 pallett and mat assemblies for the SAT program. Enterprise, Ala. Naval Air Engineering Center, Philadelphia, Pa.

—TRW, Inc., Redondo Beach, Calif. $1,067,-140. System analysis of the ASW systems program. Redondo Beach.

—United Aircraft, Stratford, Conn. $3,500,-000. Helicopters. Stratford. Naval Air Systems Command.

28—Franklin Institute, Philadelphia, Pa. $9,-300,000. Additional research, study and investigation of problems in naval warfare. Arlington, Va. Office of Naval Research.

—Treadwell Corp., New York City, N.Y. $2,080,000. Oxygen generators. New York City. Naval Ship Systems Command.

—Texas Instruments, Dallas, Tex. $1,717,863. Shrike guidance and control sections, and sets of wings and fins. Dallas. Naval Air Systems Command.

—Lansdowne Steel & Iron Co., Morton, Pa. $1,107,787. 5-inch, 38-cal. projectiles. Morton. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—Martin Marietta, Orlando, Fla. $1,002,400. Aero 5A-1 missile launchers for installation on A-4 and A-6 aircraft. Orlando. Navy Aviation Supply Office, Philadelphia, Pa.

—Sperry Rand Corp., Bristol, Tenn. $4,426,-885. Guidance and control sections, and wing and fin sets for Shrike missiles. Bristol. Naval Air Systems Command.

29—General Dynamics, Pomona, Calif. $1,-781,900. Testing and checkout of elements of the anti-air warfare systems of the USS Farragut (DLG-6) and the USS Leahy (DLG-16). Philadelphia, Pa., and Norfolk, Va. Naval Ship Systems Command.

30—Bath Iron Works Corp., Bath, Maine. $3,-725,000. Advance planning, design, material procurement and prefabrication for the modernization, rehabilitation, repair and outfitting of the destroyers USS Davis (DD-937), USS Jonas Ingram (DD-938) and USS Mullinix (DD-944). Bath. Naval Ship Systems Command.

—Continental Electronics Mfg. Co., Dallas, Tex. and RF Communications, Inc., Rochester, N.Y. $15,311,249. High frequency radio transmitters for use by various shore radio stations. Dallas. Navy Purchasing Office, Washington, D.C.

—Admiral Corp., Chicago, Ill. $6,077,302. Radio sets for use on aircraft. Chicago. Navy Aviation Supply Office, Philadelphia, Pa.

—Sargent-Fletcher Co., El Monte, Calif. $1,-382,692. Government furnished air refueling stores. El Monte. Naval Air Systems Command.

MARINE CORPS

21—Dynamics Corporation of America, Bridgeport, Conn. $1,896,000. Generator sets. Headquarters, Marine Corps.

—General Motors, Hudson, Ohio. $5,307,340. Tractors, power control units, winch attachments and ripper attachments. Headquarters, Marine Corps.

29—Anthony Co., Streator, Ill. $1,142,668. 46 cranes. Streator. Headquarters, Marine Corps.

AIR FORCE

2—Garrett Corp., Torrance, Calif. $2,732,110. Production of computer components for F-4 aircraft. Los Angeles. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

Lockheed Aircraft, Sunnyvale, Calif. $1,-697,400. Engineering support for the Agena booster system. Sunnyvale. Space Systems Div., (AFSC), Los Angeles, Calif.

North American Aviation, Anaheim, Calif. $4,223,426. $5,960,273. Production of spare parts for Minuteman missiles. Anaheim. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

5—Applied Technology, Inc., Palo Alto, Calif. $1,197,600. Production of airborne electronic equipment for B-52 aircraft. Palo Alto. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

General Motors, Indianapolis, Ind. $2,394,-201. Modification of Canadian CC-109 cargo aircraft under the Military Assistance Program. Indianapolis. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

Sanders Associates, Nashua, N.H. $4,665,-000. Production of ground communications equipment. Nashua. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass.

6—General Electric, West Lynn, Mass. $4,-991,400. Production of J-85 engines for the AT-37 aircraft. West Lynn. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

General Electric, West Lynn, Mass. $7,-330,000. Development program for T-64-12 engines for helicopters. West Lynn. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

Fairchild Camera & Instrument Corp., Syosset, N.Y. $1,379,743. Production of LS-58A camera mounts, spare parts and data. Syosset. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

Continental Aviation & Engineering Corp., Detroit, Mich. $1,404,600. Modification of T-50 turboshaft engines. Detroit. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

7—Douglas Aircraft Co., Santa Monica, Calif. $2,264,400. Design, development and fabrication of Titan III space booster components. Santa Monica. Space Systems Div., (AFSC), Los Angeles, Calif.

Applied Technology Co., Palo Alto, Calif. $1,004,636. Production of communication equipment for F-105 aircraft. Palo Alto. Warner Robins Air Materiel Area, (AFLC), Robins, AFB, Ga.

8—Consolidated Diesel Electric Co., Stamford, Conn. $2,015,140. Production of gas turbine generators. Stockton, Calif. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

General Electric, Philadelphia, Pa. $1,540,-000. Re-entry vehicle flight test program. Philadelphia. Ballistics Systems Div., (AFSC), Norton AFB, Calif.

General Electric, Philadelphia, Pa. $1,600,-000. Work on the Mark 12 re-entry vehicle program. Philadelphia. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

9—Lockheed Aircraft, Marietta, Ga. $1,318,-500. Work on an adverse weather aerial delivery system. Marietta. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

Aircraft Hydro Forming, Inc., Gardena, Calif. $2,214,622. Production of aircraft pylon bomb rack assemblies for F-105 aircraft. Gardena. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

Philco Corp., Newport Beach, Calif. $1,-660,000. Work on an advanced airborne radar system. Newport Beach. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

12—Sanders Associates, Nashua, N.H. $2,811,-403. Production of airborne radio direction finding equipment. Nashua. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

Eastman Kodak Co., Rochester, N.Y. $1,-330,310. Production of photographic processing equipment and spare parts. Rochester. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

14—Goodyear Tire & Rubber Co., Akron, Ohio. $2,101,469. Production of wheels and brake assemblies for C-141 aircraft. Akron. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

16—Oshkosh Motor Truck, Inc., Oshkosh, Wis. $1,176,000. Production of 40 aircraft towing tractors. Oshkosh. Warner-Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—Lockheed Missiles & Space Co., Sunnyvale, Calif. $2,000,000. Production of Agena space vehicles. Sunnyvale. Space Systems Div., (AFSC), Los Angeles, Calif.

—Douglas Aircraft, Santa Monica, Calif. $2,500,000. Production of Thor space boosters. Santa Monica. Space Systems Div., (AFSC), Los Angeles, Calif.

—Aerojet-General Corp., Azusa, Calif. $2,866,130. Research and development of an unmanned space technology program. Azusa. Space Systems Div., (AFSC), Los Angeles, Calif.

—TRW Inc., Systems Group Div., Redondo Beach, Calif. $2,866,130. Research and development of an unmanned space technology program. Redondo Beach. Space Systems Div., (AFSC), Los Angeles, Calif.

16—Hughes Aircraft Co., Fullerton, Calif. $18,200,000. Development and production of Tactical Control Operations Centers for the 407L System. Fullerton. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass.

19—Curtiss-Wright Corp., Wood-Ridge, N.J. $1,034,447. Production of pistons and cylinder assemblies for R-3350 aircraft engines. Wood-Ridge. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

—General Motors, Indianapolis, Ind. $6,480,000. Production of T-56 turboprop engines and related equipment. Indianapolis. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Sargent-Fletcher Co., El Monte, Calif. $7,053,600. Production of fuel tank assemblies for F-4C aircraft. El Monte. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

—Sylvania Electric Products, Mountain View, Calif. $2,600,000. Production of security subsystems and modification kits for the Minuteman missile. Mountainview and Needham, Mass. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—Collins Radio Co., Richardson, Tex. $6,801,544. Production and installation of high-frequency single sideband communications facilities. Richardson. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

20—Giannini Controls Corp., Caldwell, N.J. $3,743,006. Production of airborne flight recording instruments. Caldwell. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—U.S. Steel, Pittsburgh, Pa. $1,400,000. Production of bomb casings. Pittsburgh. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—General Electric, Ontario, Calif. $1,040,000. Overhaul and modification of J-79 aircraft engines. Ontario. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

21—Wyman-Gordon Co., Grafton, Mass. $1,883,261. Production of components for a heavy aircraft forming press. Grafton. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—General Precision, Wayne, N.J. $1,092,520. Work on air navigation equipment related to advance strategic aircraft. Wayne. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Fairchild Camera & Instrument Corp., Syosset, N.Y. $3,025,200. Production of aircraft cameras. Syosset. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—North American Aviation, Anaheim, Calif. $1,175,000. Work on radar systems related to advanced strategic aircraft. Anaheim. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Honeywell, Inc., Hopkins, Minn. $1,456,010. Production of land mine fuzes. Hopkins. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—General Electric, Utica, N.Y. $4,000,000. Production of components for airborne electronic systems. Utica. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—North American Aviation, Tulsa, Okla. $1,002,425. Overhaul and repair of air-to-ground missiles. Tulsa. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

—North American Aviation, Anaheim, Calif. $1,051,526. Overhaul and repair of air-to-ground missiles. Anaheim. Oklahoma City Air Materiel Area (AFLC), Tinker AFB, Okla.

—Atlantic Research Corp., Alexandria, Va. $1,072,094. Production of meteorological rockets and motors. Gainesville, Va. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

—Bendix Corp., Ann Arbor, Mich. $3,600,000. Production work on an emergency communications system. Ann Arbor. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass.

27—Applied Technology, Inc., Palo Alto, Calif. $1,708,306. Production of radar equipment for B-52 aircraft. Palo Alto. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—General Electric, West Lynn, Mass. $13,017,100. Production of T-58 engines for helicopters. West Lynn. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—M.I.T., Cambridge Mass. $2,480,625. Basic research in intense magnetic fields. Cambridge. Air Force Office of Scientific Research, Washington D.C.

—Marquardt Corp., Van Nuys, Calif. $1,500,000. Supersonic ramjet flight test program. Van Nuys. Systems Engineering Group, Research & Technology Div., (AFSC), Wright-Patterson AFB, Ohio.

28—Ling-Temco Vought, Greenville, Tex. $5,428,000. Research and development for modification of C-123B aircraft. Greenville. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Stanley Aviation Corp., Denver, Colo. $1,317,402. Modification kits for Navy and Air Force A-1 series aircraft. Denver. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

—Litton Systems, Woodland Hills, Calif. $3,238,075. Production of electronic equipment for F-4D and F-4E aircraft. Woodland Hills. Oklahoma City Air Material Area, (AFLC), Tinker AFB, Okla.

—Battelle Memorial Institute, Columbus, Ohio, $1,000,000. Operation of the Defense Metals Information Center for FY 1967. Columbus. Systems Engineering Group, Research & Technology Div., (AFSC), Wright-Patterson AFB, Ohio.

29—Boeing Co., Wichita, Kan. $1,513,427. B-52 stability augmentation and flight control system evaluation. Wichita. Oklahoma City Air Materiel Area (AFLC), Tinker AFB, Okla.

—Fairchild Hiller Corp., Hagerstown, Md. $1,028,449. Modification of C-123 aircraft. Hagerstown. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—Cessna Aircraft Co., Wichita, Kan. $4,500,000. Production of O-2 aircraft, spare parts, aerospace ground equipment and related data. Wichita. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Lockheed Aircraft, Jamaica, N.Y. $5,302,624. Inspection and repair as necessary of C-121 aircraft. Jamaica. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

30—Marquardt Corp., Van Nuys, Calif. $2,600,000. Analytical and experimental program to provide technology applicable to hypersonic RAMJET engines. Van Nuys. Systems Engineer Group, Research and Technology Div., (AFSC), Wright-Patterson AFB, Ohio.

—International Telephone & Telegraph Corp., Paramus, N.J. $6,860,373. Production of defense special security communications equipment. Paramus. Electronics Systems Div., (AFSC), L. G. Hanscom Field, Mass.

—Hycon Mfg. Co., Monrovia, Calif. $1,001,000. Production of high altitude aircraft cameras. Monrovia. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

Red Ball Express Completes First Year

The "Red Ball Express," a special Air Force airlift of priority combat vehicle and aircraft parts to Southeast Asia, has carried almost 9,400 tons of vital cargo to military units in Vietnam since its first flight.

The initial Red Ball flight took off from Travis AFB, Calif., for Saigon on Dec. 8, 1965. It carried only five pieces of "express" cargo, weighing 130 pounds, along with its regular load. During the year a one-day record was reached when 571 pieces, weighing a total of 105 tons, left Travis.

Named for a surface supply line system which used trucks to haul food, equipment and ammunition to the front lines of Europe during World War II, today's Military Airlift Command (MAC) operation hauls only priority parts to keep combat vehicles operating.

In its first year MAC reports its Red Ball Express has carried an average of more than 25 tons per day to Southeast Asia. The overall total of 9,363 tons was moved in 695 missions. The Red Ball aircraft constituted about five percent of the total MAC airlift to Southeast Asia during this period.

AVCOM Assumes Test Activities

Support responsibilities for the Army Aviation Test Activity (ATA) at Edwards AFB, Calif., have been reassigned from the Army Test Evaluation Command to the Army Aviation Command (AVCOM), St. Louis, Mo.

In addition, AVCOM has been assigned responsibilities for the Army element of the tri-service V/STOL team at Edwards which is now engaged in testing the Ling-Temco-Vought XC-142 cargo aircraft.

ATA originally was established in 1960. Subsequently it was assigned to the Test and Evaluation Command, Aberdeen, Md., with the reorganization of Army technical services in the early 1960's.

DEFENSE PRIME CONTRACT AWARDS TO SMALL BUSINESS

Amounts in Thousands

	July–Oct. 1966	July–Oct. 1965
Procurement from All Firms	$13,696,066	$10,133,387
Procurement from Small Business Firms	2,671,302	2,072,309
Percent Small Business	19.5	20.5

OFFICE OF THE SECRETARY OF DEFENSE
WASHINGTON, D. C. 20301

OFFICIAL BUSINESS

POSTAGE AND FEES PAID

Air Force Flight Control Research May Extend Aircraft Life Span

The U. S. Air Force has contracted for a six million dollar research program to develop an automatic flight control system that could double the useful lifetime of both present and future large, flexible aircraft such as the B–52, XB–70 and C–5A.

Called LAMS (Load Alleviation and Mode Stabilization), the program is being conducted by The Boeing Co.'s Wichita, Kan., division for the Air Force Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio, a unit of the Air Force Systems Command's Research and Technology Division. Robert P. Johannes is the program manager for the laboratory.

The flight control system being sought, already proved feasible in exploratory development, will automatically dampen structural oscilliations and reduce or alleviate stresses from wind gusts and maneuvering loads which cause metal fatigue in aircraft.

The program's goal is to extend aircraft life by 70 to 100 percent with such a system. Beside increasing structural life, the automatic flight control system will increase crew efficiency because of the smoother ride, essential on high-speed, low-level flights; provide a more stable platform to increase accuracy of weapons delivery; and aid development of equipment, techniques and design criteria for future aircraft.

Boeing will install the flight control system, two analog computers, and more than 164 strain gages in a B–52 aircraft to test the flight control techniques' capability to reduce aircraft fatigue in a realistic flight environment.

Preliminary flight tests of the B–52 aircraft are now scheduled to obtain additional information on the airplane while under normal controls. The flight demonstration phase of the automatic control system will begin in the fall of this year and be completed by the summer of 1968. Approximately 35 flights are scheduled.

Sensors will be installed on structural members of the fuselage, wings and tail surfaces in sets of three. If one sensor does not function correctly, the other two will sense the energy of motion or loading applied to the aircraft and transmit it to the computers. A 15-foot long boom on the nose of the B–52 measures wind gusts that buffet the aircraft.

Instrumentation on the test aircraft is valued at $2,500,000.

Army-Air Force Study Combat Hazard

Project WEST (Weapons Exhaust Study), a joint Army and Air Force project, is helping to prevent a potential problem which could affect helicopter crews in combat over Vietnam. Crews evaluating the Army's newer, more heavily armed helicopters, have complained of nausea and dizziness after inhaling thick concentrations of gunpowder and missile propellant fumes created during firing tests.

The Air Force Rocket Propulsion Laboratory at Edwards AFB, Calif., has teamed with the Army Aeromedical Research Unit at Fort Rucker, Ala., to examine the exhaust gases produced by various types of munitions and to determine their exact chemical composition and degree of toxicity.

Utilizing the same equipment and techniques used to evaluate rocket fuels, Project WEST engineers are conducting tests where both gunpowder and missile propellants are burned under laboratory conditions. Tests will also be conducted under field conditions in the Mojave Desert to simulate actual service operations.

Test data gathered by the Rocket Propulsion Laboratory are relayed to the Army Aeromedical Research Unit where other information from in-flight tests is being assembled and evaluated.

DEFENSE INDUSTRY BULLETIN

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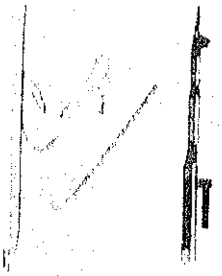
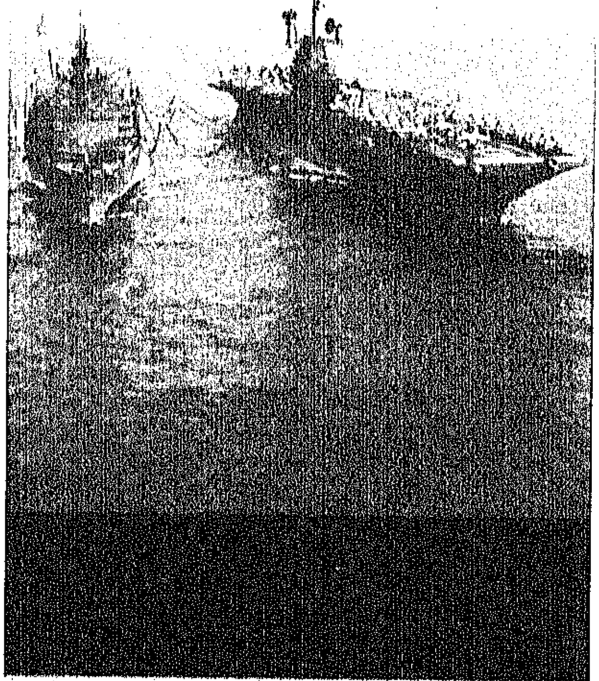
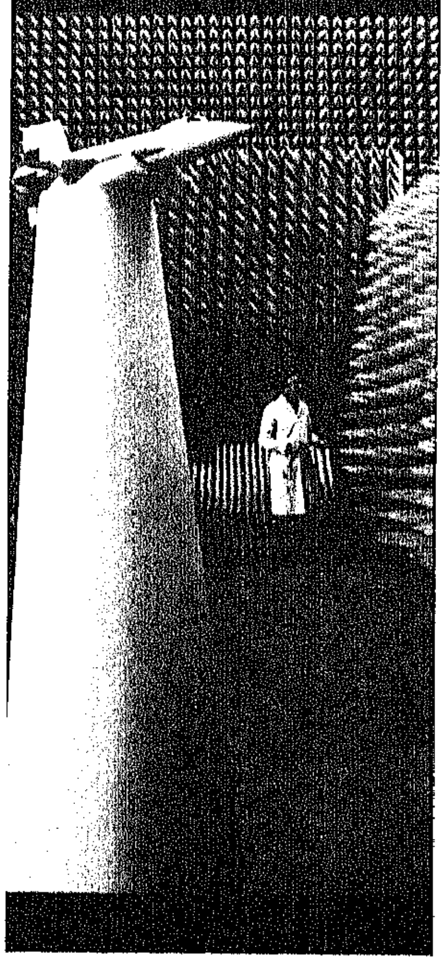
February 1967







Defense Department Budget Breakdown Fiscal Year 1968

Financial tables relating to the Defense Department budget for FY 1968, prepared by the Office of the Assistant Secretary of Defense (Comptroller), are published in this issue on pages 41 to 51.

The tables cover the following areas:

1. Budget Summary.
2. Summary of the FY 1967 Supplementals.
3. Financial Summary.
4. Direct Budget Plan [Total Obligational Authority (TOA)], New Obligational Authority and Expenditures, FY 1966–68.
5. Direct Budget Plan (TOA), New Obligational Authority and Expenditures, FY 1966–68, by Functional Title and Service.
6. Estimated Obligations and Amounts Available for Obligation, General Fund Appropriations, FY 1966–1968.
7. Estimated Expenditures and Amounts Available for Expenditure, FY 1966–1968.
8. Order of Magnitude Data on Comparative New Obligational Authority by Functional Title, FY 1954–1968.
9. Order of Magnitude Data on Comparative Expenditures by Functional Title, FY 1954–1968.
10. Financial Summary of FY 1967 Budget, Appropriations Enacted and Supplementals Proposed.
11. Net additions to the FY 1967 Procurement Program for Southeast Asia.
12. Major Procurement Item Quantities, FY 1967 and 1968 Programs.
13. Military and Civilian Personnel, Yearend Number.

DOD Procurement Conferences Set

Defense Department procurement conferences of particular interest to small business and labor surplus area firms have been scheduled during April 1967. Army, Navy, Air Force and Defense Supply Agency counselors, along with representatives of Federal civilian agencies, will be on hand with current Invitations for Bid and Requests for Proposal. Several DOD prime contractors will have representatives available to discuss subcontract opportunities.

Schedule, location and contacts are as follows:

April 7, New Orleans, La.

Contact: Kenneth A. Languth
Gulf South Research Institute
708 Maritime Building
New Orleans, La. 70130

April 20–21, Orlando, Fla.

Contact: Don Rathel
Florida Defense/Space Industries Assn.
Herndon Airport Terminal Building
Orlando, Fla. 32803

April 27, Indianapolis, Ind.

Contact: Crawford Parker
Executive Vice President
Indiana Manufacturers Assn.
120 E. Market
Indianapolis, Ind. 46204

DEFENSE INDUSTR
BULLETIN

Published by the Department of Defense

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The *Defense Industry Bulletin* is published monthly by the Business & Labor Division, Directorate for Community Relations, Office of the Assistant Secretary of Defense (Public Affairs). Use of funds for printing this publication was approved by the Director of the Bureau of the Budget.

The purpose of the *Bulletin* is to serve as a means of communication between the Department of Defense (DOD) and its authorized agencies and defense contractors and other business interests. It will serve as a guide to industry concerning official policies, programs and projects, and will seek to stimulate thought by members of the defense industry team in solving the problems that may arise in fulfilling the requirements of the DOD.

Material in the *Bulletin* is selected to supply pertinent unclassified data of interest to the business community. Suggestions from industry representatives for topics to be covered in future issues should be forwarded to the Business & Labor Division.

The *Bulletin* is distributed without charge each month to representatives of industry and to agencies of the Department of Defense, Army, Navy and Air Force. Requests for copies should be addressed to the Business & Labor Division, OASD(PA), Room 2E813, The Pentagon, Washington, D.C. 20301, telephone, (202) OXford 5-2709.

Defense Budget Highlights

Approach to the FY 1968–72 Program and the FY 1967–68 Budgets

[*Editor's Note: This issue of the* Defense Industry Bulletin *is devoted almost entirely to Secretary of Defense Robert S. McNamara's statement on Jan. 23, 1967, before a joint session of the Senate Armed Services Committee and the Senate Subcommittee on Department of Defense Appropriations on the FY 1968–72 Defense Program and the 1968 Defense Budget.*

While space limitations permit only an abbreviated treatment of the statement, an attempt has been made to excerpt those portions which are of special interest to defense industry. Using the method established in previous years, paragraph markings have been deleted from the original text for the sake of clarity.

The statement of the Secretary of Defense on the FY 1967 Supplemental for Southeast Asia will be carried in next month's issue of the Bulletin.]

Last year when I appeared before this Committee in support of the FY 1967–71 program and the FY 1967 Budget I said:

"With regard to the preparation of the FY 1967–71 program and the FY 1966 Supplemental and the FY 1967 Budget, we have had to make a somewhat arbitrary assumption regarding the duration of the conflict in Southeast Asia. Since we have no way of knowing how long it will actually last, or how it will evolve, we have budgeted for combat operations through the end of June 1967. This means that if it later appears that the conflict will continue beyond that date, or if it should expand beyond the level assumed in our present plans, we will come back to the Congress with an additional FY 1967 request."

Throughout the spring and summer of last year in my appearances before various Congressional Committees, I reiterated the fact that the FY 1967 Budget was based on the arbitrary assumption that the conflict would end by June 1967, and that additional funds would be required if the conflict continued. . . .

What we were trying to do was to avoid the overfunding which occurred during the Korean War when the Defense Department requested far more funds than were actually needed. For example, the Defense Department requested a total of about $164 billion for the three fiscal years 1951–53; the Congress appropriated a total of $156 billion; the amount actually expended was $102 billion; and the unexpended balances rose from $10.7 billion at the end of FY 1950 to $62 billion by the end of FY 1953. It took about five years to work the unexpended balance down to about $32 billion; and we were able to support a Defense program of about $50 billion a year during FY 1962–64 with about $30 billion of unexpended balances. . . .

Although we still have no way of knowing when the conflict will end, it is perfectly clear that we must take whatever measures are necessary to ensure our ability to support our forces in the event the conflict does continue beyond June 30, 1967. Indeed, when it became apparent last summer that this was likely to be the case, we continued the buildup of our military personnel strength beyond the level anticipated in the FY 1967 Budget and took action to ensure that deliveries of long lead time items would continue beyond June 30, 1967, without interruption. The Congress was informed of these actions through the reprogramming process and related hearings.

But, while it was clear even last summer that additional funds would be required for FY 1967 if the conflict in Southeast Asia were to continue, the timing and the amount of the additional request posed a problem. With regard to timing, we had essentially two alternatives: request an amendment to the FY 1967 Budget in the summer of 1966, while it was still before the Congress; or wait until early the following year and request a Supplemental appropriation. Each of these alternatives had certain advantages and disadvantages. . . .

The major disadvantage of waiting for a Supplemental has been the need to reprogram, on a rather large scale, available FY 1967 funds to meet our most urgent longer lead time procurement requirements, pending the availability of the additional funds. We recognize that this extensive reprogramming has placed an extra burden not only on the Defense Department but on the Armed Services Committees and the Defense Appropriations Subcommittees as well. Some of these reprogramming actions required the prior approval of this and other interested Commitees; all of them have been reported to the Committees concerned. However, in order to facilitate your consideration of the FY 1967 Supplemental request we have pre-

Secretary of Defense
Robert S. McNamara

pared a recapitulation of all of the major procurement program adjustments affecting that fiscal year, which will be furnished separately.

Now, with a year and a half of combat experience in Southeast Asia behind us, I believe that we have a much better understanding of our future requirements. In October 1965, when the FY 1967 Budget was being developed, we were in the midst of an explosive buildup in South Vietnam; it was then that we moved over 100,000 men 10,000 miles in less than 120 days. The future was impossible to predict with accuracy. In contrast, in October 1966, at the time of the preparation of the FY 1968 program, we could look ahead to the time when our forces in Southeast Asia could be expected to level off. . . .

Since we can now project our requirements for the conflict in Southeast Asia with far greater confidence than last year, we have changed our basic approach in preparing the FY 1967 Supplemental as well as the FY 1968 Budget. Sufficient funds are being requested in both the FY 1967 Supplemental and the FY 1968 Budget to protect the production lead time on all combat essential items until FY 1969 funds would become available. . . . Thus if it later appears that the conflict will continue beyond June 30, 1968, we would be able to use FY 1969 funds to order additional ammunition for delivery after December 1968 and keep the production lines going without interruption.

In the case of tactical aircraft, which have a production lead time on the average of about 18 months, we have included sufficient funds in the FY 1967 Supplemental and the regular FY 1968 Budget to cover deliveries at rates sufficient to offset combat attrition in Southeast Asia to January 1, 1970. If it later appears that all of such aircraft will not be required to replace combat attrition, the production of some might be cancelled and some used to modernize the forces at a faster rate than presently planned.

Similar provisions have been made in the FY 1967 Supplemental and the FY 1968 Budget for other categories of materiel which would be affected by the continuation of combat operations in Southeast Asia beyond June 1968. Accordingly, barring a significant change in the character or scope of the Southeast Asia conflict, or unforeseen emergencies elsewhere in the world, the FY 1967 Supplemental and FY 1968 Budget should be sufficient to cover our requirements until FY 1969 funds become available, even if the conflict continues beyond June 30, 1968.

Because of the large demands of the Southeast Asia conflict, I have deleted from both the FY 1967 Supplemental and the FY 1968 Budget, procurement funds which are required simply for the replacement of items already in the inventory with later models, except for tactical aircraft and helicopters and where the newer item is being procured to replace consumption. This type of marginal modernization can be safely deferred to a later time.

With regard to military construction, we have included funds in the FY 1968 Budget for military family housing and other categories of "noncombat" facilities, e.g., replacement of old barracks, BOQ's, maintenance shops, administration and school buildings, etc. We deferred these types of construction programs in FY 1966 and 1967 in order to reduce our demand on an economy already laboring under inflationary pressures. Now that these pressures appear to be subsiding, we should be prepared to assume the orderly modernization and expansion of our physical plant, which represents an investment, in terms of acquisition cost, of well over $35 billion. The rate at which we do so will depend upon economic developments during the next 12 to 18 months. In any event, we would first release the balance of the FY 1966 military construction program (about $565 million), and then move forward with the FY 1968 program, for which a total of $2,123 million has been included for Military Construction and $267 million for the construction of Military Family Housing.

Needless to say, we are continuing our cost reduction efforts with undiminished vigor. And, as you know, we have developed another list of base closings and consolidations, none of which will in any way affect our combat capabiliites in Southeast Asia or elsewhere.

By eliminating unneeded and marginal activities and deferring whatever can be safely deferred, I have been able to reduce the FY 1967 Supplemental and the FY 1968 Budget requests of the Services and Defense Agencies by about $23.3 billion, while at the same time providing for all essential military requirements. We are requesting for FY 1967 a total of $72.8 billion in new obligational authority, of which $12.3 billion is in the special Supplemental for Southeast Asia. For FY 1968 we are requesting a total of $75.3 billion in new obligational authority. Expenditures are now estimated at $67.95 billion for FY 1967 ($9.65 billion above the original budget estimate) and $73.1 billion for FY 1968.

* * * * * * * * * *

Impact of the Defense Program on the Balance of Payments

During the past year the progress that the United States has been making in its efforts to eliminate the troublesome deficit in its international balances of payments was arrested. By 1965, the overall "liquidity" deficit was slightly over $1.3 billion, down substantially from the $2.8 billion level of the previous year, and we were hoping for a further improvement in 1966. However, we now expect that when final data are available for that year, they will show that on a liquidity basis the deficit was roughly the same as the year before. The chief factors in this development were some deterioration on the trade accounts stemming from the rapid domestic economic expansion during the period and higher Defense expenditures abroad.

As you know, for many years the Department of Defense has been making a vigorous effort to reduce the net impact of its program on the U.S. balance of payments while still maintaining all necessary combat capabilities and avoiding undue hardships for the individual serviceman or his dependents. Figure 1 summarizes the results of this effort over the FY 1961–66 period.

As you can see, between FY 1961 and FY 1965 we succeeded in reducing the net adverse balance on the "Defense" account by half, from $2.8 billion to $1.4 billion. This reduction was achieved through a dramatic rise in receipts from sales of U.S. military goods and services to foreign countries, coupled with a successful effort to hold down overseas expendi-

tures in face of substantial increases in foreign prices and wages and in the pay of U.S. Defense Department personnel. For example, in Europe the cost of living went up about 16 percent and wage rates rose more than 30 percent. However, during FY 1966 the requirements of the Southeast Asia conflict, together with a modest though, hopefully, temporary decline in military sales receipts, combined to raise the net adverse balance to $2.1 billion.

The major factor underlying this rise, of course, has been the war in Vietnam. Military expenditures abroad are closely related to the size of our deployments overseas. Between June 1965 and June 1966, the total number of U.S. military personnel in South Vietnam rose from 59,900 to 267,500, an increase of 207,600. In addition, it was necessary to undertake very large construction and logistics efforts in support of operations in Southeast Asia, both of which added to the payments deficit. These additional foreign exchange costs were not unexpected (once the dimensions of our commitment there became apparent), and I reported to you a year ago that the conflict might raise such costs several hundred million dollars above pre-buildup levels; indeed, we now estimate that there were approximately $500 million of such additional expenditures in FY 1966.

We recognized this threat to our balance of payments from the beginning and we have taken extraordinary measures to minimize its impact. Nevertheless, we must expect that the higher Southeast Asia deployments planned over the next year and a half will inevitably cause our overseas spending to rise still higher in the months ahead. Indeed, it now appears that Vietnam-related foreign exchange costs in FY 1967 will run over $1 billion higher than the pre-buildup year of FY 1965.

In previous years I have described in some detail the Defense Department's actions to limit the balance of payments effects of our overseas programs, including:

- The prompt withdrawal of U.S. forces from overseas areas whenever changes in circumstances, our own capabilities, or those of our allies permit such action.
- A continuing review of the requirement for and the efficient utilization of overseas installations with a view to eliminating or consolidating these facilities in order to reduce their costs to a minimum.
- Acceptance of up to 50 percent cost penalties (in some cases more) in order to favor procurement of U.S.-produced goods and services over those of foreign countries. Through FY 1966, nearly $300 million of such procurement was diverted to U. S. sources.
- The virtual cessation of new offshore procurement for the Military Assistance Program. In FY 1966, expenditures for such procurement were less than a third the FY 1963 level.
- Efforts to encourage Defense Department personnel to reduce their overseas spending and, conversely, to increase their personal savings.
- Sharp curbs on the size of U.S. headquarters staffs abroad and on the number of foreign national employees.

With the escalation of the conflict in Southeast Asia, a number of special measures have been added. For example, in the area of personal spending, disbursement procedures were modified to make it easier for a serviceman to leave his pay "on the books" or increase the size of the allotment sent home. A most promising step was the enactment by the Congress last August of the Uniform Service Savings Deposit Program which authorizes interest rates of up to 10 percent to encourage savings by servicemen overseas. We have initiated a vigorous educational program to complement this new savings opportunity and the results to date have been most encouraging. Total deposits under this legislation in the first three months (September–November 1966) totaled $23.4 million.

In the construction area, special procedures have been put into effect to minimize the balance of payments costs of our large building program in Southeast Asia, again with gratifying results to date. For example, during FY 1966, only about one-fifth of the $372 million paid our principal contractor in Vietnam entered the balance of payments. The rest in effect was "returned" to the United States to buy American goods and services, including transportation on U.S. flag vessels. Most important, this was accomplished without impeding in any way the progress of the construction work itself.

With respect to military receipts, the decrease in FY 1966 can be traced almost entirely to the phasing of actual receipts from the Federal Republic of Germany, with whom we have had an agreement to offset U.S. military expenditures in that country. The basic agreement called for the Germans to make payments in FY 1966–67 of $1,350 million for purchases of U.S. military goods and services required to meet their defense needs.

With regard to our military sales program, I have the impression that our policies and objectives in this area are not very well understood, either at home or overseas. For example, allegations have been made:

- That we are forcing unwanted arms on countries.
- That we are selling arms to coun-

($ Billions, Fiscal Years)	1961	1962	1963	1964	1965	1966
EXPENDITURES						
U.S. Forces and their Support (Excl Incr in SEA Exp over FY 61)	$2.5	$2.4	$2.4	$2.5	$2.3	$2.4
Military Assistance	.3	.2	.3	.2	.2	.2
Other (AEC, etc.)	.3	.3	.3	.1	.1	.1
Total	$3.1	$3.0	$3.0	$2.8	$2.6	$2.6
RECEIPTS	— .3	— .9	— 1.4	— 1.2	— 1.3	— 1.2
NET ADVERSE BALANCE (Excl Incr in SEA Exp over FY 61)	$2.8	$2.1	$1.6	$1.6	$1.2	$1.4
Increase in SEA Exp over FY 61)	——	——	.1	.1	.2	.7
NET ADVERSE BALANCE	$2.8	$2.1	$1.7	$1.7	$1.4	$2.1

Figure 1

tries which have no legitimate use for them and which could better use their scarce resources to improve the lot of their people.

• That by indiscriminately selling arms, we are promoting the arms race and undermining the peace.

• That in some cases our military sales efforts are thwarting the objectives of our own economic aid programs.

• That our military sales efforts are motivated primarily by balance of payments considerations, abetted by the desire for profits on the part of U.S. manufacturers.

All of these allegations are false and are based on a misunderstanding or lack of knowledge of the facts involved. I believe it would be useful, therefore, to review briefly the background and origin of the present foreign military sales program.

It has been widely recognized in our country, at least since the Korean War, that the collective defense of the Free World required armed allies, and somewhat more belatedly, that the internal security of most countries requires some armed forces. Circumstances of history, in particular the greatly weakened economic condition of most countries following World War II, forced on the United States the role of major armament supplier to the Free World. Accordingly, during the decade of the 1950's, the United States had to meet the legitimate armament needs of its friends primarily through a large grant aid program. Indeed, of the $22 billion of U.S. military exports during the 1950's, $17 billion were financed by Congressional appropriations.

By the latter part of the decade, however, many of these countries had become prosperous again, enabling them to produce more of their own arms or buy them abroad. At the same time, this rising affluence allowed several of these countries to rebuild their monetary reserves. Also, between FY 1957 and the end of FY 1961, the United States lost about $5 billion of its gold holdings while its liquid liabilities to foreigners (which represent potential claims on our gold) had risen from about $15 billion to about $22 billion.

This increasing prosperity of many of our allies was reflected in our military assistance policies. Grant aid by FY 1961 had already declined from an average annual level of $2 billion-plus during the 1950's to about $1.5 billion. Since FY 1961, this downward trend has continued with grant aid declining both absolutely and relatively. Whereas in FY 1961, there were two dollars of grant aid for every dollar of military sales to foreign recipients, by FY 1966 the ratio had been reversed. Moreover, I think it is important to note that, in terms of total value, U.S. military exports in the ten-year period, FY 1962–71, are not expected to be measurably higher than in the decade, FY 1952–61; the big change will be in the shift in the way these exports are financed—from grant aid in the 1950's to military sales in the 1960's.

With this shift in emphasis from grant aid to sales, it was decided to organize the latter on a more formal basis within the Department of Defense, indeed, to make it a separate program. The principal objective of this foreign military sales program is, however, basically the same as that of the grant aid program, i.e., to promote the defensive strength of our allies in a way consistent with our overall foreign policy objectives. Encompassed within this objective are several specific goals:

• To further the practice of cooperative logistics and standardization with our allies by integrating our supply systems to the maximum extent feasible and by helping to limit proliferation of different types of equipment.

• To reduce the costs, to both our allies and ourselves, of equipping our collective forces, by avoiding unnecessary and costly duplicative development programs and by realizing the economies possible from larger production runs.

• To offset, at least partially, the unfavorable payments impact of our deployments abroad in the interest of collective defense.

Three basic standards were established to govern the conduct of our foreign military sales program:

• We will not sell equipment to a foreign country which we believe it cannot afford or should not have.

• We will never ask a potential foreign customer to buy anything not truly needed by its own forces.

• We will not ask any foreign country to purchase anything from the United States, which it can buy cheaper or better elsewhere.

These standards are fully consis-tent with the spirit of the provisio[n] added to the Foreign Assistance Ac[t] last year, which calls for the sale[s] program to be administered in such a way as to encourage reciproca[l] arms control and disarmament agree-ments and discourage arms races...

Over the next five years, we esti-mate that the countries of the non-communist world will have legitimate requirements for substantial amounts of new military equipment. Based on past experience, we believe that many of these requirements can be most effectively met by purchases from us. However, our ability to realize this potential will depend on one major condition: we must convince our allies that the U.S. military sales program is not a threat to their long-range national interests. And, as I mentioned previously, we must be willing, as a nation, to make military trade a "two way" street. For our part, the Defense Department will continue to take every opportunity to promote cooperative logistics arrangements—including cooperative research and development efforts—and to emphasize the important contribution which the sales program can make in furthering the objectives of collective defense.

Turning again to our international payments position, for the near term future, the prospects for any reduction in the net adverse balance on the "military" account must rest on an increase in sales receipts, and there are both practical and desirable limits as to how much relief we can or should expect from this source. In Europe, we should be able to make a net reduction in the size of our logistics support establishment in the process of relocating from France, although there will be some initial offsetting costs for the relocation itself. In the Far East, we will face continuing high foreign exchange costs as long as our Vietnam deployments remain large.

Let me assure the Committee, however, that despite our preoccupation with the important national security objective we are charged with accomplishing, we remain keenly aware of the burden that our overseas programs place on the nation's international balance of payments. In this regard, we have no intention of relaxing our efforts to make that burden as light as possible.

Strategic Forces

In this section of my statement I will dicuss the three major programs which, together, constitute the foundation of our general nuclear forces, and civil defense. Because of their close inter-relationship and, indeed, their interaction, it is essential that all three of these programs be considered within a single analytical framework.

The General Nuclear War Problem

During the past several years, in my annual appearances before this committee, I have attempted to explore with you some of the more fundamental characteristics of the general nuclear war problem and the kinds of strategic forces which it involves. I noted that our general nuclear war forces should have two basic capabilities:

- To deter deliberate nuclear attack upon the United States and its allies by maintaining, continuously, a highly reliable ability to inflict an unacceptable degree of damage upon any single aggressor, or combination of aggressors, at any time during the course of a strategic nuclear exchange, even after absorbing a surprise first strike.
- In the event such a war nevertheless occurred, to limit damage to our population and industrial capacity.

The first capability we call "Assured Destruction" and the second "Damage Limitation." The strategic offensive forces—the ICBM's, the submarine-launched ballistic missiles (SLBM's), and the manned bombers —which we usually associate with the first capability, can also contribute to the second. They can do so by attacking enemy delivery vehicles on their bases or launch sites, provided they can reach those vehicles before they are launched at our cities. Conversely, the strategic defensive forces—manned interceptors, anti-bomber surface-to-air missiles, anti-ballistic missile (ABM)—which we usually associate with the second capability can also contribute to the first. They can do so by successfully intercepting and destroying the enemy's offensive weapons before they reach our strategic offensive forces on their bases and launch sites.

As long as deterrence of a deliberate Soviet (or Red Chinese) nuclear attack upon the United States or its allies is the overriding objective of our strategic forces, the capability for Assured Destruction must receive the first call on all of our resources and must be provided regardless of the costs and the difficulties involved. Damage Limiting programs, no matter how much we spend on them, can never substitute for an Assured Destruction capability in the deterrent role. It is our ability to destroy an attacker as a viable 20th Century nation that provides the deterrent, not our ability to partially limit damage to ourselves.

What kind and amount of destruction we would have to be able to inflict on an attacker to provide this deterrent cannot be answered precisely. However, it seems reasonable to assume that in the case of the Soviet Union, the destruction of, say, one-fifth to one-fourth of its population and one-half to two-thirds of its industrial capacity would mean its elimination as a major power for many years. Such a level of destruction would certainly represent intolerable punishment to any industrialized nation and, thus, should serve as an effective deterrent to the deliberate initiation of a nuclear attack on the United States or its allies.

Assured Destruction with regard to Red China presents a somewhat different problem. China is far from being an industrialized nation. However, what industry it has is heavily concentrated in a comparatively few cities. We estimate, for example, that a relatively small number of warheads detonated over 50 Chinese urban centers would destroy half of the urban population (more than 50 million people) and more than one-half of the industrial capacity. Moreover, such an attack would also destroy most of the key governmental, technical and managerial personnel and a large proportion of the skilled workers. Since Red China's capacity to attack the United States with nuclear weapons will be very limited, even during the 1970's, the ability of even a very small portion of our strategic offensive forces to inflict such heavy damage upon them should serve as an effective deterrent to the deliberate initiation of such an attack on their part.

Once sufficient forces have been procured to give us high confidence of achieving our Assured Destruction objective, we can then consider the kinds and amounts of forces which might be added to reduce damage to our population and industry in the event deterrence fails. But here we must note another important point, namely, the possible interaction of our strategic forces programs with those of the Soviet Union. If the general nuclear war policy of the Soviet Union also has as its objective the deterrence of a U. S. first strike (which I believe to be the case), then we must assume that any attempt on our part to reduce damage to ourselves (to what they would estimate we might consider an "acceptable level") would put pressure on them to strive for an offsetting improvement in their deterrent forces. Conversely, an increase in their Damage Limiting capability would require us to make greater investments in Assured Destruction, which, as I will describe later, is precisely what we now propose to do.

It is this interaction between our strategic forces programs and those of the Soviet Union which leads us to believe that there is a mutuality of interests in limiting the deployment of anti-ballistic missile defense systems. If our assumption that the Soviets are also striving to achieve an Assured Destruction capability is correct, and I am convinced that it is, then in all probability all we would accomplish by deploying ABM systems against one another would be to increase greatly our respective defense expenditures, without any gain in real security for either side. It was for this reason that President Johnson decided to initiate negotiations with the Soviet Union, designed, through formal or informal agreement, to limit the deployment of ABM systems, while including at the same time about $375 million in his FY 1968 Budget to provide for such actions—e.g., protection of our offensive weapon systems—as may be required if these discussions prove unsuccessful.

In this connection, it might be useful to reiterate another fundamental point, namely, that the concept of Assured Destruction implies a "second strike" capability, i.e., a strategic force of such size and sufficient strength to destroy the attacker. Thus, if Assured Destruction is also a Soviet objective, they must always view our strategic offensive forces in their planning as a potential first strike threat (just as we view their forces) and provide for a second strike capability.

The Size and Character of the Threat

In order to assess the capabilities of our general nuclear war forces over the next several years, we must take into account the size and character of the strategic forces which the Soviet Union and Red China are likely to have during the same period. Again, let me caution that, while we have reasonable high confidence in our estimates for the close-in period, our estimates for the early part of the next decade are subject to much uncertainty. As I pointed out in past appearances before this Committee, such longer range projections are, at best, only informed estimates, particularly since they deal in many cases with a period beyond the production and deployment lead times of the weapon systems involved.

The Soviet Strategic Offensive-Defensive Forces.

Two significant changes have occurred during the last year in our projections of Soviet strategic forces. The first is a faster-than-expected rate of construction of hard ICBM silos; the second is more positive evidence of a deployment of an anti-ballistic missile defense system around Moscow. (Both of these developments fall considerably short of what we assumed in the "higher-than-expected" threat, against which we have been hedging for several years.) Our current estimates for other elements of the Soviet strategic forces are generally in line with those I discussed here last year.

Summarized in the following table are the Soviet's strategic offensive forces estimated for Oct. 1, 1966. Shown for comparison are the U. S. forces.

U.S. vs Soviet Intercontinental Strategic Nuclear Forces

	Oct. 1, 1966 U. S.[a]	Oct. 1, 1966 USSR
ICBM's[b]	934	340
SLBM's (U.E. Launchers)[c]	512	130
Total Intercontinental Ballistic Missiles[d]	1,446	470
Intercontinental Bombers[e]	680	155

Intercontinental Ballistic Missiles. As of now, we have more than three times the number of intercontinental ballistic missiles (i.e., ICBM's, and SLBM's) the Soviets have. Even by the early 1970's, we still expect to have a significant lead over the Soviet Union in terms of numbers and a very substantial superiority in terms of overall combat effectiveness. In this connection, we should bear in mind that it is not the number of missiles which is important, but rather the character of the payloads they carry; the missile is simply the delivery vehicle. Our superiority in intercontinental bombers, both in numbers and combat effectiveness, is even greater and is expected to remain so for as far ahead as we can see. There is still no evidence that the Soviets intend to deploy a new heavy bomber in the late 1960's.

Anti-Ballistic Missile Defense. We have been aware for many years that the Soviets have been working on an anti-ballistic missile defense system, just as we have been. After a series of abortive starts, it now appears that the Soviets are deploying such a system (using the "GALOSH" missile, publicly displayed in 1964) around Moscow. They are also deploying another type of defensive system elsewhere in the Soviet Union, but the weight of the evidence at this time suggests that this system is not intended primarily for anti-ballistic missile defense. However, knowing what we do about past Soviet predilections for defense systems,[f] we must, for the time being, plan our forces on the assumption that they will have deployed some sort of an ABM system around their major cities by the early 1970's. Whether made up of GALOSH only, or a combination of GALOSH and other types of missiles, a full scale deployment would cost the Soviet Union at least \$20 to \$25 billion.

[a] *These are mid-1966 figures.*

[b] *Excludes test range launchers and Soviet MR/IRBM's capable of striking Eurasian targets.*

[c] *In addition to the SLBM's, the Soviets possess submarine-launched cruise missiles whose primary targets are naval and merchant vessels.*

[d] *In 1965, intelligence reports estimated Soviet intercontinental missiles as of mid-1966 to number between 430 and 500.*

[e] *In addition to the intercontinental bombers shown in the table, the Soviets possess medium bombers capable of striking Eurasian targets.*

The Red Chinese Nuclear Threat.

There has been no basic change in in our estimates of the Red Chinese nuclear threat. Their firing of a nuclear armed missile over a distance of a few hundred miles last October falls within the limits of that estimate. . . .

With regard to an ICBM, we believe that the Red Chinese nuclear weapons and ballistic missile development programs are being pursued with high priority. On the basis of recent evidence, it appears possible that they may conduct either a space or a long-range ballistic missile launching before the end of 1967. However, it appears unlikely that the Chinese could deploy a significant number of operational ICBM's before the mid-1970's, or that those ICBM's would have great reliability, speed of response, or substantial protection against attack.

Red China also has some bombers which could carry nuclear weapons, but most of them have an operational radius of only a few hundred miles. It is highly unlikely, on the basis of cost alone, that they would undertake the development, production and deployment of a new, long range bomber force. If they chose to do so, it would take them a decade or more before they could deploy it. Accordingly, we have no reason on this account to change our estimate that a significant Red Chinese nuclear threat to the continental United States will not develop before the mid-1970's.

[f] *The Soviets for more than a decade have spent substantially more on air defense against strategic bombers than has the United States. But if our Strategic Air Command is correct in its judgment that a very high proportion of the U. S. incoming bombers could penetrate the Soviet defenses and reach their targets, and I have no reason to dispute it, then we must conclude that the bulk of these Soviet expenditures has been wasted.*

Capabilities of the Proposed Forces for Assured Destruction

The most demanding test of our Assured Destruction capability is the ability of our strategic offensive forces to survive a well coordinated surprise Soviet first strike directed against them. Because no one can know how a general nuclear war between the United States and the Soviet Union might occur, prudence dictates that we design our own strategic forces on the basis of a greater threat than we actually expect.

Capability Against the Expected Threat.

Even if the Soviets in the 1972 period were to assign their entire available missile force to attacks on our strategic forces (reserving only refire missile and bomber-delivered weapons for urban targets), more than one-half of the total forces programmed last year for 1972 would still survive and remain effective.

Considering the overall size and character of that force, it is clear that our strategic missiles alone could destroy the Soviet Union as a viable 20th Century society, even after absorbing a well coordinated, surprise first attack. Indeed, the detonation of even one-fifth of the total surviving weapons over Soviet cities would kill about 30 percent of the total population (73 million people) and destroy about one-half of the industrial capacity. By doubling the number of warheads delivered, Soviet fatalities and industrial capacity destroyed would be increased by considerably less than one-third. Beyond this point further increments of warheads delivered would not appreciably change the result, because we would have to bring smaller and smaller cities under attack, each requiring one delivered warhead.

Although it is not at all certain that they will do so, we must, as I noted earlier, base our force planning on the assumption that the Soviets will deploy a reasonably effective ABM defense around their principal cities; and we must be prepared to overwhelm it.

We have been hedging against this possibility for some time, and last year we took a number of actions of which the following are the most important:

- Accelerated development of the Poseidon missile.
- Approved production and deployment of Minuteman III.
- Developed penetration aids for Minuteman.

Now, in the FY 1968 program we propose to take a number of additional actions to enhance the future capabilities of our Assured Destruction forces, of which the following are the more important:

- Produce and deploy the Poseidon missile.
- Produce and deploy improved missile penetration aids.
- Increase the proportion of Minuteman III in the planned force and provide it with an improved third stage.
- Initiate the development of new reentry vehicles, specifically designed for use against targets heavily defended with ABM's.

I will discuss each of these actions in greater detail later in connection with our other proposals for the strategic forces. But for now, let me point out that the net effect of these actions would be to increase greatly the overall effectiveness of our Assured Destruction force against the Soviet Union by mid-1972. Even if the Moscow-type ABM defense were deployed at other cities as well, the proposed U.S. missile force alone could inflict about 35 percent (86 million) fatalities on the Soviet Union in 1972—after absorbing a surprise attack.

As I noted earlier, a relatively small number of warheads detonated over fifty cities would destroy half of Red China's urban population and more than one-half of her industry.

Thus the strategic missile forces proposed for the FY 1968–72 period would, by themselves, give us an Assured Destruction capability against both the Soviet Union and Red China, simultaneously.

Capability Against "Higher-Than-Expected Threats."

As I indicated last year, our Assured Destruction capability is of such crucial importance to our security that we must be prepared to cope with Soviet strategic threats which are greater than those projected in the latest intelligence estimates.

The most severe threat we must consider in planning our Assured Destruction forces is an extensive, effective Soviet ABM deployment combined with a deployment of a substantial ICBM force with a hard-target kill capability. Such a Soviet offensive force might pose a threat to our Minuteman missiles. An extensive, effective Soviet ABM system might then be able to intercept and destroy a significant portion of our residual missile warheads, including those carried by submarine-launched missiles. (The Soviet offensive and defensive threats assumed here are both substantially higher than expected.)

To hedge against the possibility of such a threat to our land-based missile forces, we have authorized the development and production of the Poseidon. Should still additional offensive power be required, and such a requirement is not now clear, we are considering the development and deployment of a new Advanced ICBM, designed to reduce vulnerability to such a Soviet threat. The deployment of the Nike-X as a defense for our Minuteman force would offer a partial substitute for the possible further expansion of our offensive forces.

But again I want to emphasize that we don't know whether the Soviet Union will develop and deploy the kind of forces assumed here. Even against this higher-than-expected threat, and even without a Nike-X defense of Minuteman, our proposed strategic missile and bomber forces could still inflict 40 percent or more fatalities on the Soviet population throughout the time period involved.

More extreme threats are highly unlikely. In any event, the changes we are now proposing in our strategic offensive forces would make it dangerous and expensive for the Soviet Union to move in the direction of more extreme threats to our Assured Destruction capability. If we assume, as I believe we should, that the Soviets would want to reduce the vulnerability of their own offensive forces against the possibility of a first strike by our very accurate forces in the FY 1972–73 period, they must further disperse and harden their strategic missiles, which is exactly what they appear to be doing now. To do so is expensive and for the same budget outlay results in reduced missile payloads. Not to do so would leave the Soviet force highly vulnerable. Thus we can, in planning our forces, foreclose any seemingly "easy" and "cheap" paths to their

achievement of a statisfactory Assured Destruction capability and a satisfactory Damage Limiting capability at the same time.

We, of course, cannot preclude the possibility that the Soviet Union may increase its strategic forces budget at some time in the future. That is why we are now undertaking a very comprehensive study of a new strategic missile system. And that is why we are not precluding the possible future construction of new Poseidon submarines or the defense of our presently deployed Minuteman silos with Nike-X. While I believe we should place ourselves in a position to move forward promptly on all of these options if later that should become necessary, we need not commit ourselves to them now.

Capabilities of the Proposed Forces for Damage Limitation

The principal issue in this area of the Strategic Forces Program concerns the deployment of an ABM defense system, i.e., Nike-X. There are three somewhat overlapping but distinct major purposes for which we might want to deploy such a system at this time:

- To protect our cities (and their population and industry) against a Soviet missile attack.
- To protect our cities against a Red Chinese missile attack in the mid-1970's.
- To help protect our land-based strategic offensive forces (i.e., Minuteman) against a Soviet missile attack.

After studying the subject exhaustively, and after hearing the views of our principal military and civilian advisors, we concluded that we should not initiate an ABM deployment at this time for any of these purposes. We believe that:

- The Soviet Union would be forced to react to a U.S. ABM deployment by increasing its offensive nuclear force still further with the result that the risk of a Soviet nuclear attack on the United States would not be further decreased; and the damage to the United States from a Soviet nuclear attack, in the event deterrence failed, would not be reduced in any meaningful sense.

As I noted earlier, the foundation of our security is the deterrence of a Soviet nuclear attack. We believe such an attack can be prevented if it is understood by the Soviets that we possess strategic nuclear forces so powerful as to be capable of absorbing a Soviet first strike and surviving with sufficient strength to impose unacceptable damage on them. We have such power today. We must maintain it in the future, adjusting our forces to offset actual or potential changes in theirs.

There is nothing we have seen in either our own or the Soviet Union's technology which would lead us to believe we cannot do this. From the beginning of the Nike-Zeus project in 1955 through the end of this current fiscal year, we will have invested a total of about $4 billion on ballistic missile defense research—including Nike-Zeus, Nike-X and Project Defender. And, during the last five or six years, we have spent about $1.2 billion on the development of penetration aids to help ensure that our missiles could penetrate the enemy's defenses. As a result of these efforts, we have the technology already in hand to counter any offensive or defensive force changes the Soviet Union might undertake in the forseeable future.

We believe the Soviet Union has essentially the same requirement for a deterrent or Assured Destruction force as the United States. Therefore, deployment by the United States of an ABM defense which would degrade the destruction capability of the Soviet's offensive force to an unacceptable level would lead to expansion of that force. This would leave us no better off than we were before.

- With respect to protection of the United States against a possible Red Chinese nuclear attack, the lead time required for China to develop a significant ICBM force is greater than that required for deployment of our defense—therefore the Chinese threat in itself would not dictate the production of an ABM system at this time.
- Similarly, although the protection of our land-based strategic offensive forces against the kind of heavy, sophisticated missile attack the Soviets may be able to mount in the mid- or late 1970's might later prove to be worthwhile, it is not yet necessary to produce and deploy the Nike-X for that purpose.

I have already discussed, in connection with my review of the capabilities of our strategic forces for Assured Destruction, the third major purpose for which we may want to deploy an ABM defense (i.e., the protection of Minuteman). Now, I would like to discuss the other two purposes.

Deployment of Nike-X for Defense of Our Cities Against a Soviet Attack.

What is involved here is an analysis of the contribution the Nike-X system might make to the defense of our cities under two assumptions:

- That the Soviets do not react to such a deployment.
- That the Soviets do react in an attempt to preserve their "Assured Destruction" capability.

As you know, the major elements of the Nike-X system are being developed in such a way as to permit a variety of deployments; two have been selected for the purposes of this analysis. The first, which I will call "Posture A," represents a light U. S. defense against a Soviet missile attack on our cities. It consists of an area defense of the entire continental United States, providing redundant (overlapping) coverage of key target areas; and, in addition, a relatively low-density Sprint defense of a number of the largest cities to provide some protection against those warheads which get through the area defense. The second deployment, which I call "Posture B," is a heavier defense against a Soviet attack. With the same area coverage, it provides a higher-density Sprint defense for twice the number of cities.

Shown on the Figure 1 are the components and the costs (which, if past experience is any guide, may be understated by 50 to 100 percent for the systems as a whole)[8] of Posture A and Posture B.

[8] *Even before the systems became operational, pressures would mount for their expansion at a cost of still additional billions. The unprotected, or relatively unprotected, areas of the United States would claim that their tax dollars were being diverted to protect New York and Washington while they were left naked. And, critics would point out that our strategic offensive force is premised on a much larger Soviet threat (the "possible," not the "probable" threat); they would conclude that the same principles should be applied to our strategic defensive forces. For these and other reasons, I believe that, once started, an ABM system deployed with the objective of protecting the United States against the Soviet Union would require an expenditure on the order of $40 billion over a 10-year period.*

The Multi-function Array Radar (MAR) is a very powerful phased-array radar which can perform all the defense functions involved in engaging a large, sophisticated attack: central control and battle management, long-range search, acquisition of the target, discrimination of warheads from decoys or "spoofing" devices, precision tracking of the target, and control of the defense interceptor missiles.

The TACMAR Radar is a scaled down, slightly less complex and less powerful version of the MAR, which can perform all the basic defense functions in a smaller, less sophisticated attack.

The Perimeter Acquisition Radar (PAR) is a phased-array radar required for the very long-range search and acquisition functions involved in area defense. To achieve the full potential of the extended range Spartan, the target must be picked up at much greater distances in order to compute its trajectory before the Spartan is fired.

The Missile Site Radar (MSR) is a much smaller, phased-array radar needed to control the Sprint and Spartan interceptor missiles during an engagement. It can also perform the functions of the TACMAR but on a considerably reduced scale. Actually, a number of different sizes are being studied. This "modular" approach will permit us to tailor the capacity of the radar to the particular needs of each defended area.

The Spartan is a three-stage missile with a nuclear warhead capable of intercepting incoming objects at relatively long range above the atmosphere.

The Sprint is a shorter range, high-acceleration interceptor missile designed to make intercepts at lower altitudes.

The technical principles involved in the radars are now fairly well established. One research and development MAR-type has been constructed at the White Sands Missile Range. A contract has been let for the power plant of a second MAR-type radar, which is to be constructed on Kwajalein Atoll. The Missile Site Radar is well along in development and the construction of one of these radars on Kwajalein Atoll has also begun.

Testing of the Sprint missile was started at White Sands in November 1965 and the tempo of testing will steadily increase during the current year. The Spartan is still on the drawing boards. It represents a very substantial redesign of the original Zeus and we will not know until it is flight tested how well it will perform.

Facilities for testing both the Sprint and the Spartan will be constructed on Kwajalein Atoll. These, together with the TACMAR and MSR and the programs for the computers, will give us all of the major elements of the Nike–X system which are essential to test its overall performance against reentry vehicles fired from Vandenberg AFB, Calif. (We feel we know enough about the PAR technology to be able to use the mechanically steered radars already on Kwajalein as simulators.) The system will be tested in stages, starting with the MSR and Sprint, then the Spartan missile and the TACMAR radar. A large number of test shots will be launched from the west coast of the United States to Kwajalein to test the system thoroughly as a whole. The most important objective of this effort is to determine proper system integration and computer programming, since the individual components of the system will have already been tested.

But even after this elaborate test program is completed, some technical uncertainties will still remain unresolved; this is to be expected in a system designed for such a highly complex mission. Moreover, we have learned from bitter experience that even when the development problems have been solved, a system can run into trouble in production or when it is put into operation. All too often the development prototype cannot be produced in quantity without extensive re-engineering. Production delays are encountered and costs begin to spiral. Sometimes these problems are not discovered until the new system actually enters the inventory and has to function in an operational environment. . . .

In this connection, it is worth noting that had we produced and deployed the Nike-Zeus system proposed by the Army in 1959 at an estimated cost of $13 to $14 billion, most of it would have had to be torn out and replaced, almost before it became operational, by the new missiles and radars of the Nike-X system. By the same token, other technological developments in offensive forces over the next seven years may make obsolete or drastically degrade the Nike-X system as presently envisioned. We can predict with certainty that there will be substantial additional costs for updating any system we might consider installing at this time against the Soviet missile threat.

The deployment of a Nike-X system would also require some improvement in our defense against manned bomber attack in order to preclude the Soviets from undercutting the Nike-X defense; and we would want to expand and accelerate the fallout shelter program. The investment cost (including research and development)

	POSTURE A Invest. Cost ($ Billion)	POSTURE B Invest. Cost ($ Billion)
Radars		
MAR		
TACMAR		
PAR		
MSR		
Invest. Cost	$ 6.5	$12.6
Missiles		
Spartan		
Sprint		
Invest. Cost	$ 2.4	$ 4.8
DOD Invest. Cost	$ 8.9	$17.4
AEC Invest. Cost	1.0	2.0
Total Invest. Cost (excluding R&D)	$ 9.9	$19.4
Annual Operating Cost	$ 0.38	$ 0.72
No. of Cities w/Term. Def:	X	2X

Figure 1

of the former is estimated at about $1.[illegible] to $2.4 billion and would provide for a small force of F-111 or F-12 type interceptors and airborne warning and control aircraft (AWACS). An expanded fallout shelter program would cost about $800 million more than the one we are now producing. We would also need some of our anti-submarine warfare (ASW) forces for use against Soviet missile submarines, but we are not yet clear whether these ASW forces would actually have to be increased over the currently planned levels. In any event, the "current" estimates of the investment cost of the total Damage Limiting package would amount to at least $12.2 billion for Posture A and at least $21.7 billion for Posture B.

To test the contribution that each of these Nike-X deployments might make to our Damage Limiting objectives, we have projected both the U.S. and Soviet strategic nuclear forces (assuming no reaction by the Soviets to the U.S. ABM deployment) to the time when Posture B, the heavier defense, could be fully in place.

The fatalities which these Soviet forces could inflict upon the United States (with and without a U.S. ABM defense) and the fatalities which the U. S. forces could inflict on the Soviet Union (with a Soviet ABM defense) are shown in the Figure 2.

The first case, "Soviets Strike First, U. S. Retaliates," is the threat against which our strategic forces must be designed. The second case, "U.S. Strikes First, Soviets Retaliate," is the case that would determine the size and character of the Soviet reaction to changes in our strategic forces, if they wish, as they clearly do, to maintain an Assured Destruction capability against us.

These calculations indicate that without Nike-X and the other Damage Limiting programs discussed earlier, U.S. fatalities from a Soviet first strike could total about 120 million; even after absorbing that attack, we could inflict on the Soviet Union more than 120 million fatalities. Assuming the Soviets do not react to our deployment of an ABM defense against them, which is a most unrealistic assumption, Posture A might reduce our fatalities to 40 million and Posture B to about 30 million.

Although the fatality estimates shown for both the Soviet Union and the United States reflect some variations in the performance of their respective ABM systems, they are still based on the assumption that these systems will work at relatively high levels of effectiveness. If these ABM systems do not perform as well as our technical people postulate, fatalities on both sides could be considerably higher than shown in Figure 2, or the costs would be considerably higher if major improvements or additions had to be made in the systems to bring them up to the postulated level of performance.

If the Soviets are determined to maintain an Assured Destruction capability against us and they believe that our deployment of an ABM defense would reduce our fatalities in the "U.S. Strikes First, Soviets Retaliate" case to the levels shown in Figure 2, they would have no alternative but to increase the second strike damage potential of their offensive forces. They could do so in several different ways. Shown in the table below are the relative costs to the Soviet Union of responding to a U.S. ABM deployment in one of these possible ways:

Level of U.S. Fatalities Which Soviets Believe Will Provide Deterrence[a] (Millions)	Cost to the Soviets of Offsetting U.S. Cost to Deploy an ABM
40	$1 Soviet cost to $4 U.S. cost
60	$1 Soviet cost to $2 U.S. cost
90	$1 Soviet cost to $1 U.S. cost

[a] *U. S. fatalities if United States strikes first and Soviets retaliate.*

If the Soviets chose to respond in that way to our ABM deployment, the results would be as shown in Figure 3.

In short, the Soviets have it within their technical and economic capacity to offset any further Damage Limiting measures we might undertake, provided they are determined to maintain their deterrent against us. **It is the virtual certainty that the Soviets will act to maintain their deterrent which casts such grave doubts on the advisability of our deploying the Nike-X system for the protection of our cities against the kind of heavy, sophisticated missile attack they could launch in the 1970's. In all probability, all we would accomplish would be to increase greatly both their defense expenditures and ours without any gain in real security to either side.**

Defense Against the Red Chinese Nuclear Threat.

With regard to the Red Chinese nuclear threat, an austere ABM defense might offer a high degree of protection to the nation against a missile attack, at least through the 1970's. The total investment cost of such a program might amount to $3.5 billion, including the cost of the nuclear warheads.

The effectiveness of this deployment in reducing U. S. fatalities from a Red Chinese attack in the 1970's is shown in the table below:

Chinese Strike First
(Operational Inventory)

U.S. Fatalities (in millions)	X Missiles	3X Missiles
Without ABM	5	10
With ABM	0+	1

Number of Fatalities[a] in an All-Out Strategic Exchange (in millions)[b]
(ASSUMES NO SOVIET REACTION TO U.S. ABM DEPLOYMENT)

U.S. Programs	Soviets Strike First, U.S. Retaliates: U.S. Fat.	Soviets Strike First, U.S. Retaliates: Sov. Fat.	U.S. Strikes First, Soviets Retaliate[c]: U.S. Fat.	U.S. Strikes First, Soviets Retaliate[c]: Sov. Fat.
Approved	120	120+	100	70
Posture A	40	120+	30	70
Posture B	30	120+	20	70

[a] Fatality figures shown above represent deaths from blast and fallout; they do not include deaths resulting from fire storms, disease, and general disruption of everyday life.
[b] The data in this table are highly sensitive to small changes in the pattern of attack and small changes in force levels.
[c] Assumes United States minimizes U. S. fatalities by maximizing effectiveness of strike on Soviet offensive systems.

Figure 2

This austere defense could probably preclude damage in the 1970's almost entirely. As the Chinese force grows to the level it might achieve by 1980–85, additions and improvements might be required, but relatively modest additional outlays could probably limit the Chinese damage potential to low levels well beyond 1985.

It is not clear that we need an ABM defense against China. In any event, the lead time for deployment of a significant Chinese offensive force is longer than that required for U.S. ABM deployment; therefore, the decision for the latter need not be made now.

In the light of the foregoing analysis, we propose:

• To pursue with undiminished vigor the development, test and evaluation of the Nike-X system (for which purpose a total of about $440 million has been included in the FY 1968 Budget), but to take no action now to deploy the system.

• To initiate negotiations with the Soviet Union designed, through formal or informal agreement, to limit the deployment of ABM systems.

• To reconsider the deployment decision in the event these discussions prove unsuccessful; aproximately $375 million has been included in the FY 1968 Budget to provide for such actions as may be required at that time, e.g., the production of Nike-X for the defense of our offensive weapon systems.

I would now like to turn to our specific proposals for the Strategic Forces in the FY 1968–72 period.

Strategic Offensive Forces

The force structure proposed for the FY 1968–72 period is shown in the classified table furnished to the Committee.

Missile Forces.

Last year I told this Committee that:

"The U.S. response to a Soviet deployment of an ABM defense would be the incorporation of appropriate penetration aids in our strategic missiles. Against area defense interceptors, penetration aids can be provided for U.S. missiles (so that an Assured Destruction capability is maintained) at a cost to us of less than 10 percent of the cost of an ABM defense to the Soviets. The lead time for the Soviets to mount an ABM defense is greater than the time for us to produce and deploy penetration aids, provided we take timely action to develop them and can move forward promptly to produce them, and this we are doing. The decision actually to deploy new penetration aids can be made later this year. If the Soviets did attempt a large ABM defense we would still be able to produce and install the necessary penetration aids before the Soviets could achieve an extensive deployment.

". . . against a combined Soviet expanded strategic missile/ABM threat, the most efficient alternative available to us would be to develop Poseidon (with the new penetration aids) and retrofit it into Polaris boats. To hedge against the possibility of such a threat, we now propose to accelerate the development of the Poseidon missile (which was initiated last year). The timing of a decision to produce and deploy the missile would depend upon how this threat actually evolved."

This is essentially the program we now propose to pursue.

Minuteman. Last year we had planned a Minuteman force which would ultimately have consisted of a mix of 1,000 Minuteman II's and Minuteman III's, with all the Minuteman I's phased out. Now, in order to increase the capability of this force against a possible strong Soviet ABM defense, we propose to increase the proportion of Minuteman III's in the force and equip them with a new improved third stage which will increase the payload of each missile. This increased payload will enable the Minuteman III to carry more penetration aids to counter an ABM defense. The total cost of this program is estimated at $400 million, but it will cost the Soviet Union many times more in ABM defenses if they try to offset it.

We also propose to step up the schedule for re-equipping the Minuteman II's with an improved reentry vehicle and to procure penetration aid packages for all Minuteman II and III missiles. Engineering development was started on these penetration aid packages last year. The total cost of this program is estimated at $315 million, of which $100 million was provided through FY 1967, $125 million is required in FY 1968, and another $90 million in subsequent years.

Eventually, it will probably become necessary to replace the earliest Minuteman II missiles because of their age. At that time we could add more Minuteman III's if that should appear desirable. Meanwhile, I believe we should initiate the development of a new improved reentry vehicle for the Minuteman III, and funds for this purpose have been included in the budget request.

Polaris-Poseidon. By the end of the current fiscal year, 39 of the planned 41-ship Polaris force will have become operational. The last two Polaris submarines will be deployed by September 1967. . . .

I also believe it would be prudent at this time to commit the Poseidon missile to production and deployment. . . . In order to hold a minimum the number of submarines which would have to be withdrawn from the operational fleet, we propose to spread the Poseidon retrofit program over a period of years on a schedule tied to the regular overhaul cycle.

. . . The total incremental cost of developing Poseidon, and producing

Number of Fatalities in an All-Out Strategic Exchange (in millions)
(ASSUMES SOVIET REACTION TO U.S. ABM DEPLOYMENT)

	Soviets Strike First, U.S. Retaliates		U.S. Strikes First, Soviets Retaliate	
U.S. Programs	U.S. Fat.	Sov. Fat.	U.S. Fat.	Sov. Fat.
Approved (no response)	120	120+	100	70
Posture A	120	120+	90	70
Posture B	120	120+	90	70

Figure 3

and deploying the proposed force is estimated at $3.3 billion. A total of about $900 million is included in the FY 1968 Budget for Poseidon. (The decision to deploy Poseidon will produce an offsetting saving of about $200 million in the Polaris program.)

Funds have also been included in the budget for the development of certain desired improvements for the Polaris missile.

Titan II. The Titan II force, consisting of 54 missiles deployed in hard silos, presently makes a unique contribution to our strategic offensive capabilities. . . . However, with the deployment of Minuteman III and, later, of the Poseidon, this capability of the Titan II will no longer be unique. The Minuteman III from the continental United States and the Poseidon from forward undersea locations will be able to reach all the important targets in the Soviet Union.

. . . Accordingly, we now propose to end procurement of new Titan boosters for testing and operational reliability demonstration with the FY 1966 buy, and, instead, use boosters already in the inventory for these purposes in the future. With about six follow-on tests per year, the force of 54 TITAN missiles on launchers can be maintained for a number of years.

New Strategic Missile Systems. Although we believe the strategic missile programs now proposed will be adequate to meet the threat, even if the Soviet Union were to carry out a full scale deployment of an ABM system and develop more effective ICBM's, we are making a very comprehensive study of a new long-range missile system. To shorten the lead time on any option selected as a result of this study, we have included funds in the FY 1968 Budget for contract definition should such a decision become warranted.

Strategic Bomber Forces.

ibor forces

will be phased out as planned, leaving a force of 255 B-52G-H's and 210 FB-111A's.

Since the new FB-111's with the SRAM air-to-surface missile will be entering the bomber force during FY 1969-71 and the B-52G/H's can be maintained in a suitable operational condition well into the 1970's, there is no pressing need to decide on the production and deployment of a new bomber in the FY 1968 Budget. Clearly, the first order of business in the strategic offensive forces program at this time is the provision of penetration aids and other improvements for our presently planned strategic missile force, and the production and deployment of the new Poseidon. . . . Nevertheless, we plan to continue work on the engine, avionics, and the related airframe studies, for which a total of $26 million is programmed for FY 1968.

Air Launched Missiles.

Last year I said that we planned to keep the Hound Dog missiles in the operational inventory through FY 1970, phasing their number down in step with the phase out of the B-52C-F's. We now propose to phase out the older Hound Dog "A" by end FY 1968, retaining only the "B" models. . . .

The SRAM program is unchanged from that which I presented last year. While we still do not plan to deploy SRAM on the B-52G-H's, we are continuing the development of the necessary avionics to permit such a deployment if it should become desirable.

Strategic Reconnaissance.

The strategic reconnaissance force is the same as that presented a year ago.

Strategic Defensive Forces

The strategic defensive forces proposed for the FY 1968-72 period are shown on the classified table provided to the Committee. The Civil Defense program for FY 1968 is shown separately.

Surveillance, Warning and Control.

The programs shown under this heading are, with two exceptions, the same as those I presented last year. Activation of BUIC III control centers will slip somewhat from the schedule shown last year due to delays in firming up the technical details of the program. The delay will be made up by the temporary retention of two of the BUIC II control centers and 12 of the manual backup centers through FY 1968. By end FY 1969 all 19 BUIC III's should be operational and the remaining BUIC II and manual control centers will be phased out.

The second change pertains to the search radars. Last year we had planned to reduce the number of these radars to 161 by end FY 1967. As you may recall, this reduction was predicated on the internetting of our radar system with that of the Federal Aviation Agency (FAA). However, in order to make the inputs from the FAA radars compatible with the SAGE-BUIC III system, they must first be converted into appropriate computer language by a special piece of equipment called a "digitizer." Because of a slippage in the production of this digitizer, five more Defense Department radars will have to be operated until FY 1969, when we expect to be able to reduce the number to 149. . . .

Manned Interceptors

The manned interceptor forces are generally the same as those presented last year.

As you know, we have been studying during the past several years various ways of modernizing our air defense forces. Interceptor versions of both the SR-71 (F-12) and the F-111 have been considered for this role. Either one, equipped with the improved ASG-18/AIM-47 fire control and missile system and used with an effective Airborne Warning and Control System (AWACS), would be better than the present interceptors in operating from degraded bases and independently of the vulnerable fixed ground environment, and in countering concentrated bomber attacks, including air-to-surface missiles. In fact, a small force of such aircraft operating with AWACS would have a combat capability superior to the programmed force of several hundred Century series fighters and the hundreds of ground radar and control sites.

The feasibility of this plan, however, depends upon the successful development of the AWACS. We now have a test program under way to examine three proposed solutions to the problem of developing an overland airborne radar which could provide effective coverage at all altitudes. Design efforts are also being pursued on the airframe and

avionics. We hope that by the end of this year sufficient data will be available to demonstrate the feasibility of the AWACS. Only then will we be in a position to make a decision on the interceptor force. Accordingly, we propose to continue development work on both the F-12 and the F-111 types of interceptors and on the fire control and missile systems, and $20 million is included in the FY 1968 Budget for this purpose. Although no additional funds are requested for work on the AWACS airframe, another $10 million is included in the FY 1968 Budget to continue work on overland radar technology.

Surface-to-Air Missiles

The Nike Hercules and Hawk missile forces are the same as planned a year ago except that we now intend to replace eventually some of the present Hawk missiles with the new Improved Hawk which is now in development.

In addition to the Improved Hawk, which is designed primarily for the field forces, we also have in advanced development a new surface-to-air missile called the SAM-D. While this system is also primarily oriented toward air defense of the field forces, it also has a potential application for continental air defense. This effort, thus far, has been directed mainly to development of the required components or "building blocks" and a deployment decision at this time would be premature. Additional funds have been included in the FY 1968 Budget to continue development.

Ballistic Missile Warning.

The numbers of Ballistic Missile Early Warning Systems (BMEWS) and Over-the-Horizon (OTH) radar sites are the same as shown last year. . . .

We are also continuing work on "back scatter" Over-the-Horizon radars. . . .

An interim capability to detect sea launched ballistic missiles (SLBM's) is being phased in during FY 1968. The SLBM detection system will include modified SAGE and SPACETRACK radars.

Anti-Satellite Defense.

As described in previous years, we have a capability to intercept and destroy hostile satellites within certain ranges. This capability will be maintained through FY 1968.

Civil Defense

The Civil Defense program proposed for FY 1968 is essentially the same in content and objectives as that approved for the current year. The funds requested would carry forward the Civil Defense program at about the same level as the current fiscal year. A financial summary of the program, estimated to cost $111 million in FY 1968, appears in Figure 4.

Financial Summary

The Strategic Forces programs I have outlined will require Total Obligational Authority of $8.1 billion in FY 1968. A comparison with prior years is shown below:

FINANCIAL SUMMARY OF CIVIL DEFENSE
(TOA*, in $ Millions)
(Fiscal Years)

	1962	1963	1964	1965	1966	1967	1968
Shelter Survey	58.4	9.3	7.1	10.6	17.7	18.4	18.0
Shelter Improvement	—	—	—	1.4	.5[b]	—	—
Shelter Development	.3	1.4	1.7	3.6	5.1	5.0	3.7[c]
Marking & Stocking	90.3	32.7	24.2	2.3	1.1	1.5	4.8
Shelter Use	—	—	—	4.5	2.7	2.3	3.8
Warning	6.8	4.1	1.8	2.7	.6	.8	.9
Command, Control & Communications	22.9[a]	3.1	6.5	8.4	11.6	3.9	2.8
Emergency Operations Support	16.8	10.1	6.7	6.0	6.6	6.5	9.7
Financial Assistance	18.9	27.5	23.7	25.6	23.9	27.0	30.0
Information Activities	3.9	3.4	2.0	1.4	1.7	2.3	2.5
Management	12.4	13.6	13.9	14.3	12.0	12.6	13.2
Research & Development	19.0	11.0	10.0	10.0	10.0	10.0	10.0
Training & Education	2.6	9.2	12.9	10.7	11.6	11.7	11.6
TOTALS**	252.3	125.4	110.5	101.5	105.1	102.1	111.0

SHELTER SPACES[d]
(Millions, Cumulative)

	1963	1964	1965	1966	1967	1968
Identified	103.7	121.4	135.6	152.1	162.0	170.0
Marked[e]	42.8	63.8	75.9	85.3	97.0	112.0
Stocked[e]	9.7	23.8	33.8	41.3	49.0	56.0

[a] Includes $2.3 million carryover from OCDM for construction of a Regional Center; $13.4 million returned to Treasury—not used by GSA in Federal building construction.
[b] Includes Packaged Ventilation Kits.
[c] Includes Architect and Engineer advisory services on design techniques.
[d] Shelter spaces resulting from the currently approved program; FY 63-66 are actual, FY 67-68 are estimated.
[e] Only public shelters having 50 or more space are eligible for marking and stocking.
*Total Obligational Authority.
**Totals may not add due to rounding.

Figure 4

	1962 Act.	1963 Act.	1964 Act.	1965 Act.	1966 Act.	1967 Est.	1968 Prop.
Strategic Forces	11.2	10.5	9.8	7.1	6.8	7.1	8.1

General Purpose Forces

The General Purpose Forces include most of the Army's combat and combat support units, virtually all Navy units (except for the Polaris forces), all Marine Corps units, and the tactical units of the Air Force. These are the forces upon which we rely for all military actions short of general nuclear war, i.e., limited war and counterinsurgency operations.

Requirements for General Purpose Forces

Over the last few years I have presented to the Committee in considerable detail our analysis of the limited war problem and our requirements for General Purpose Forces. I have pointed out that our strategic nuclear capability is designed to deter attack at but one end of the spectrum of aggression and that we must, therefore, have other forms of military power, both to deter lesser aggressions and to defeat them if deterrence fails. We need these other forms of military power, not so much for the defense of our own territory as for the support of our commitments to other nations under the various collective defense arrangements we have entered into since the end of World War II. These include the Rio Pact in the Western Hemisphere, NATO in Europe, SEATO and ANZUS in the Far East, and the bilateral mutual defense agreements with Korea, Japan, the Republic of China and the Philippines.

All of these mutual defense treaty commitments, involving a total of some 40-odd sovereign nations, stem from the great policy decision, made at the end of the Second World War, to base our security on the collective defense of the Free World. . . .

In fact even without these treaty obligations, I suspect that our country's action would not have differed significantly in the more than two decades which have elapsed since the end of World War II. . . . We must remember that we twice came to the assistance of our friends in Western Europe without any prior treaty commitments; we did so because we deemed it vital to our own security. We came to the assistance of South Korea—and we are now assisting South Vietnam—for the same reason. So it is not the treaties themselves that cause our greater involvement in the affairs of the rest of the world, but rather what we deem to be our own vital national security interests over the longer run. . . .

While the distinction between General Nuclear War Forces and Limited War Forces is somewhat arbitrary in that all of our forces would be employed in a general war, and certain elements of our strategic forces in a limited war (e.g., the B-52's against the Viet Cong forces in Vietnam), it is primarily the limited war mission which shapes the size and character of the General Purpose Forces. Because we cannot predict in detail the actual contingencies we may have to face, we must build into our forces a capability to deal with a very wide range of situations. This accounts for the great diversification in the kinds of units, capabilities, weapons, equipment, supplies and training which must be provided and seriously complicates the task of determining specific requirements.

Nevertheless, our continuing study of these requirements has reaffirmed my conclusion that the General Purpose Forces which I presented here a year ago are about the right order of magnitude. This conclusion takes into account the contributions to collective defense which our allies can be expected to make, as well as our own going capability to concentrate our military power rapidly in a distant threatened area. . . .

Although our General Purpose Forces are primarily designed for non-nuclear warfare, we do not preclude the use of nuclear weapons even in limited wars. However, as I have pointed out in previous years, the employment of such weapons in a limited war would not necessarily be to our advantage in every case, and it would present some extremely difficult and complex problems. . . .

A careful review of our General Purpose Force requirements, including the temporary augmentations for Southeast Asia, indicates a need in FY 1968 for a total land force of about 31⅓ division force equivalents. By "division force" I mean the division itself, plus all of its supporting forces, . . . The Army will have 18⅓ active division equivalents; and the Marine Corps, four. . . .

With regard to tactical airpower we now have a total of about 4,800 fighter, attack and reconnaissance aircraft which constitute the unit equipment of the combat squadrons of both the active and reserve forces of the Air Force, Navy and Marine Corps. . . .

The non-aviation naval forces are more difficult to summarize in this manner and I will discuss them in detail later in the context with the Navy General Purpose Forces.

As I have pointed out on numerous occasions in the past, it is not enough that our forces be of the right size and composition; they must also be provided with the weapons, equipment, ammunition and supplies needed to sustain them in combat. And, since most combat operations will usually involve all the Services, the logistics objectives, which prescribe in broad terms the equipping and stockage standards to be followed, must be as uniform as possible throughout the Department. These objectives, together with the forces to be supported and our contingency deployment plans, determine the content (and costs) of the annual procurement programs.

Of course, the specific procurement programs to achieve these logistic objectives must realistically take account of the state of the production base, especially for ammunition. The purpose of our war reserve inventories is to provide our forces with sufficient supplies to conduct sustained combat until production can be raised sufficiently to offset combat consumption. In peacetime, therefore, when production rates are tailored to low levels of consumption and attrition, it is important to have large stocks on hand, equal or nearly equal to the calculated war reserve objectives. However, once our forces have been committed to combat and production has been built up to offset current consumption, as is now the case in the current conflict, it is not necessary (indeed, it would be imprudent) to rebuild those stocks to their pre-combat inventory levels before the conflict ends. It is not necessary because our present expanded production base will be able to provide for all expected Southeast Asia consumption as well as any

other contingency or contingencies which might arise. It would be imprudent because we know from experience that when the conflict ends, we either would have to shut down the lines abruptly, with all of the resultant adverse consequences for our economy, or we would have to acquire unwanted surpluses.

Accordingly, we have planned our FY 1967–68 procurement program in such a way that if the war should end suddenly, we can taper off production gradually, using the excess production capacity to rebuild our inventories to the desired pre-combat levels. At the present production rates, this could be achieved very quickly. For items which are not currently in expanded production for Southeast Asian operations, or for new items just entering the inventory, we will, of course, continue to procure toward our logistics objectives with the goal of achieving them, wherever feasible and desirable, with the FY 1968 buy.

Capabilities of the Programmed Forces

As I noted earlier, our General Purpose Forces requirements are derived from analyses of contingencies, including the support of our allies around the world. Accordingly, our General Purpose Forces capabilities must be assessed in conjunction with the capabilities of these allied forces. Although we have considerable knowledge of the force plans of our allies, we cannot be sure how they will change with the passage of time. This creates some uncertainty about the specific requirements for U.S. forces in the more distant years of the five-year programming period, for which we must make allowances in our force planning. . . .

Army General Purpose Forces

The Department of Defense for many years, and under several Administrations, has been striving to make the "One Army" concept a reality as well as a slogan. You may recall that when I appeared before the Congressional Committee in May 1961 in support of President Kennedy's recommendations on the realignment of the Army reserve components, I noted that "they must be so organized, trained, and equipped as to permit their rapid integration into the active Army." Since that time we have not only been working on the question of how the reserve components should be organized but also on how the reserve and active Army structures could best be meshed together. This latter question requires not only a comprehensive analysis of the total Army force requirement but also a very careful and detailed analysis of which elements of the total structure should be provided in the active forces and which in the reserve forces.

Fundamental to this type of analysis is the concept of a "division force." Although the combat division has long been the most widely used standard for measuring the strength of the land forces, it accounts for only about one-third of the combat and support units required to sustain the division in combat over an extended period of time. . . . A "ready" division without "ready" support elements would be incapable of combat. The division force concept ensures that our planning explicitly recognizes this relationship (indeed, interdependence) between the division and its major support elements, since it requires us to identify these elements in detail.

As a first approach to the problem, we have grouped all of the organized (TO&E) units of the division force into three categories:

- The division itself.
- The initial support increment (ISI), i.e., the non-divisional combat and combat support units which are required to support the division in the initial combat phase.
- The sustaining support increment (SSI), i.e., the additional non-divisional units including the combat, combat support, and service support needed by the division for sustained combat operations beyond the initial phase.

By structuring the division force in this way, we can see more clearly the relationship of the divisions themselves to the other Army units shown on the classified table provided to the Committee. . . .

In addition, the division force concept helps us to:

- Relate standards of unit readiness, manning levels, etc., directly to the time phased unit deployment schedules, which underlie our contingency planning.
- Determine more precisely which units must be provided in the active forces and which could be provided in the reserve components.
- Tailor forces for particular missions, operational environments, and tempos of activity.
- Understand better the relationship between support functions (supply, maintenance, transportation, etc.) and combat functions (maneuver and fire power), thereby enabling us to achieve a better allocation of resources among them.
- Calculate more precisely the personnel and materiel requirements of each unit.

While the concept still needs considerable development before all of the foregoing advantages can be fully realized, it has already proved of significant value in our force planning. . . .

Army Force Structure.

The integrated active-reserve Army force structure proposed for the FY 1968–72 period is grouped under three main headings—division and brigade forces, major supporting forces, and combat and support battalions.

Division and Brigade Forces. Because of the temporary Vietnam augmentations to the active Army, the force structure we are proposing at the end of FY 1968 is the equivalent of 27⅓ division forces in the active and reserve structure combined (18⅓ active and nine reserve components). . . .

You may recall that funds were included in the FY 1967 Budget to initiate procurement of long-leadtime items for the conversion of a second division to the airmobile configuration, if experience proved this desirable. The existing airmobile division, the 1st Cavalry, proved its worth in Vietnam and I have, therefore, tentatively approved the conversion of an airborne division to an airmobile configuration. The actual timing of this action is subject to the preparation of a detailed conversion plan by the Army and the JCS, but for planning purposes we have scheduled it for early FY 1969. . . .

Major Supporting Forces. This grouping covers the major supporting forces, most of which represent the initial or sustaining support for the division and brigade forces. In FY 1969 (when an airborne division is

converted to airmobile), the Army will keep a portion of the airborne assets to form a new permanent airborne brigade, thereby establishing the brigade total at seven. . . .

Combat and Support Battalions. . . . We now propose to make a small increase in the number of maneuver battalions. . . .

With respect to artillery battalions, the demands of the conflict in Southeast Asia together with our continuing study of the peacetime force requirements have caused us to make a number of changes in the structure. First, we now plan to increase the number of artillery battalions in the active forces. Second, our experience in Vietnam has shown that the mix of separate artillery battalions could contain more heavy 8″ howitzers and 175mm gun battalions. Accordingly, a significant portion of the increase in artillery battalions will be of these types.

The number of engineer combat battalions in the active forces has been temporarily increased in order to meet Southeast Asia needs. . . .

The buildup of aviation units in the Army will continue through FY 1968. . . .

. . . We now plan to initiate in FY 1968 a new development program designed to ensure that the Nike-Hercules can continue to operate effectively in the 1970's. This new program, together with the Hawk Improvement Program, will provide a hedge against possible slippage in the development of the SAM-D which is tentatively planned as a replacement for both Hercules and Hawk.

Last year we had tentatively planned to start procurement of the Improved Hawk in FY 1968. . . . However, the project has encountered some development problems and the program has slipped. Meanwhile, we will go ahead with production preparations, using the funds provided in FY 1967 and those requested in FY 1968 for production engineering and production prototype missiles.

Three types of operational gun/Chaparral battalions are being formed; a fully self-propelled battalion for the armored and mechanized divisions; a modified self-propelled version (including one towed gun battery which can be airlifted) for the infantry division; and an all-towed version for the airmobile and airborne divisions. . . .

Army Procurement.

The revised FY 1967 Army procurement program now totals $5,863 million, of which $2,130 million is included in the Supplemental. The 1968 program totals $5,881 million. . . .

. . . The FY 1967 program now totals $1,202 million for 2,697 aircraft, of which $533 million is included in the Supplemental request. The FY 1968 program includes $769 million for 1,479 aircraft. The aircraft to be procured include the UH–1B/D (Iroquois) tactical utility transport helicopter, the AH– 1G (Cobra) armed helicopter, the CH–47 (Chinook) transport helicopter, the OH–6A observation helicopter, the CH–54A heavy lift helicopter, the U–21A administrative support aircraft, the OV–1C (Mohawk) fixed-wing observation aircraft, as well as a large number of training helicopters.

Funds are also requested for the procurement of long-lead-time components for the AH–56A Advanced Aerial Fire Support System (AAFSS) to permit early initiation of production, when development warrants such a decision.

Army missile procurement (including spares) will total $561 million in FY 1967 and $769 million in FY 1968. The FY 1968 program provides for ground support equipment for the Quick Reaction Alert Pershing battalions deployed in Europe; Lance missiles and related ground support equipment; initial procurement of the TOW missile system; a large quantity of Shillelagh missiles; Redeye and Chaparral air defense missiles; and ground support and training equipment for the Hawk missile system.

The revised FY 1967 program for weapons and combat vehicles totals $589 million ($83 million in the Supplemental request), and $554 million is included in the FY 1968 Budget request. These funds will provide for completion of the planned procurement of the M–139 (HS–820) 20mm gun; substantial quantities of the 20mm Vulcan air defense gun and the 5.56mm rifle; and additional 81mm mortars and self-propelled 155mm howitzers. The funds requested will also provide for procurement of the M–578 light recovery vehicle, the General Sheridan armored reconnaissance and airborne assault vehicle, the M113 armored personnel carrier, the 81mm and 107mm self-propelled mortars, the M–577 command post carrier and the M–548 cargo carrier. We have also included funds for M–60's with the 105mm gun, M–60's with the Shillelagh/152mm gun, the armored vehicle bridge, and the combat engineer vehicle, all of which use the M–60 chassis.

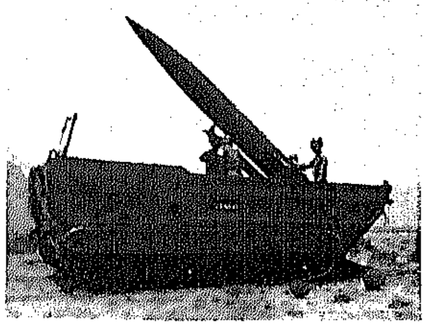
. . . In FY 1968, advance production engineering for the Main Battle Tank will require $11 million. Additional funds will be required for the U.S. share of the development costs.

The revised FY 1967 program for trucks and other non-combat vehicles total $653 million ($154 in the Supplemental request). For FY 1968, $483 million is requested for a variety of these vehicles. Included in the FY 1968 program are ¼-ton, 1¼-ton (M715), 2½-ton and 5-ton trucks of all types. . . .

For communications and electronics procurement, the revised FY 1967 program provides $617 million ($303 million in the Supplemental request) and the FY 1968 request totals $550 million.

For ammunition the Army's revised FY 1967 program includes $1,361 million ($584 million in the Supplemental request). For FY 1968, $2,224

U. S. Army UH–1G



U. S. Army Lance Missile

million is requested. Ammunition procurement will continue to increase in FY 1968 in order to meet the projected needs of Southeast Asia. Among the major items are: small arms ammunition (5.56mm, 7.62mm, and 30 caliber); 40mm ammunition; 81mm, 105mm, 106mm, 152mm, 155mm, and 4.2 inch cartridges; and 2.75 inch rockets.

The revised FY 1967 program for other support equipment (road graders, tractors, etc.) totals $608 million ($247 million in the Supplemental request) and $437 million is requested for FY 1968. The revised FY 1967 program for production base support totals $272 million, ($220 million in the Supplemental request) and $95 million is requested for FY 1968.

Navy General Purpose Forces

The Navy General Purpose Forces proposed for the FY 1968-72 period are shown on the classified table provided to the Committee. Except for the Vietnamese-related forces, the major changes from the program planned last year concern the antisubmarine warfare forces, the guided missile ships, the amphibious ships and the minesweepers. There is, however, one general problem in this area which deserves special mention, and that is the dolorous state of the American shipbuilding industry.

It has become increasingly apparent in recent years that our shipbuilding industry, both public and private, has fallen far behind its competitors in other countries. Not only does it cost twice as much to build a ship in this country, it also takes twice as long. . . .

This is a startling development in view of the fact that the United States is the most highly industrialized nation in the world. It is even more startling when we realize that the modernization of the European and Japanese yards has been achieved by applying, on a massive scale, U.S. automobile and aircraft manufacturing technology to shipbuilding. . . .

Unfortunately, public discussion of the shipbuilding problem in this country has been focused on what is actually the minor part—its relationship to the Merchant Marine problem. I can well understand why the American Flag Line operators should wish to sever the present interlocking relationship between the Merchant Marine and the shipbuilding industry; they could buy ships abroad at half the price and get delivery in about half the time. But while this divorce might solve the problem of the Merchant Marine, it would not solve the problem of the Defense Department. The U.S. Merchant Marine provides only a few hundred million dollars of work per year to the shipbuilding industry; Navy work amounts to between $2 and $2.5 billion a year. Thus the Defense Department, and the taxpayer, has a stake in the American shipbuilding industry which goes far beyond the immediate problems concerning the Merchant Marine.

Obviously, the more fundamental solution is to revitalize the American shipbuilding industry. Although we may never be able to overcome completely the wage rate differential, there is no reason why the American shipbuilding industry should not be, in a technological sense, as good as the best any other country has to offer. We have the technology and the manufacturing "know how;" what we need to do is to find some way in which they can be applied to the American shipbuilding industry and some way to finance the relatively large investments that would be required.

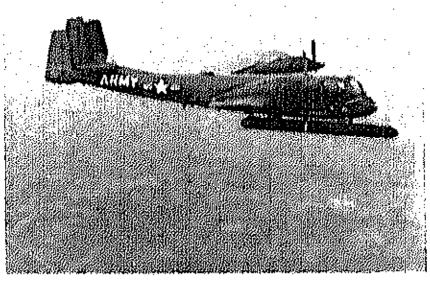
With regard to Navy work, the Defense Department has already embarked on such a program. Wherever feasible, we are grouping our annual shipbuilding program into multi-year procurement. . . .

Of perhaps greater significance over the longer run is the new procurement package approach, of which the Fast Deployment Logistics (FDL) ship is an outstanding example. Under this approach, the shipbuilder is asked to bid on the entire package — design, development and construction—of a relatively large number of ships to be delivered over a period of years, much like the package approach to aircraft procurement. Several new programs of this type are contemplated, and I will discuss these in context with our proposals for the Navy General Purpose Forces in the FY 1968-72 period.

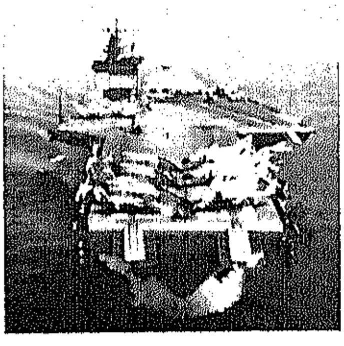
Attack Carrier Forces.

Last year, I described to the Committee a new plan under which we would maintain an active fleet of 15 attack carriers and 12 air wing equivalents, instead of the 13 carriers and 13 air wings we were planning on before. We made this change because of new force structure promises to provide significantly more usable combat power than the one previously planned—and at no increase in cost. However, a force of 15 carriers and 12 air wing equivalents would require some change in the present mode of operation. Carriers would normally deploy in peacetime with less than the maximum complement of aircraft and additional aircraft would be flown to the carriers when and as needed. In effect, we would be treating the attack carrier as a forward floating air base, deploying the aircraft as the situation requires, much as we do in the present carrier operations off Vietnam. It is this kind of operational flexibility that enables the attack carriers to make a unique contribution to our overall tactical air capabilities.

Although the adjustment of the air wings to the new force structure is scheduled to begin in FY 1968 and be completed by FY 1971, the total number of combat aircraft assigned to the attack carrier force will re-



U. S. Army OV-1 Mohawk


USS Enterprise CVA (N) 65

main virtually unchanged. You may recall that two years ago, in a decision unrelated to the number of carrier wings, we decided to increase the number of light attack aircraft per squadron, and the number of light attack squadrons per Forrestal-class carrier. In terms of aircraft assigned, these increases, together with the replacement of Essex-class carriers with the much larger Forrestal's and Enterprise's will just about offset the reduction to 12 equivalent air wings. In other words, each equivalent air wing will have about 25 percent more aircraft than the present average air wing.

Ships. The attack carrier force at the end of the current fiscal year will consist of one nuclear-powered carrier, the Enterprise, and seven Forrestal-, two Midway- and five Essex-class. In FY 1969, the last of the conventionally powered attack carriers now under construction, the John F. Kennedy, will join the Fleet, followed in FY 1972 by the second of the nuclear-powered carriers.

As I stated last year, if we are to retain a force of 15 carriers, two more will have to be provided. One is scheduled for FY 1969 and one in a later year; both will be nuclear powered. Fifty million dollars is included in the FY 1968 Budget for long lead time components for the FY 1969 carrier. When these ships are delivered to the Fleet, the remaining Essex-class carriers will be retired from the CVA force, which would then consist of four nuclear powered, eight Forrestal- and three Midway-class carriers, for a total of 15.

Carrier Aircraft. No major change is contemplated in the composition of the aircraft complement of the attack carrier forces from that projected a year ago. The decline in the number of fighter aircraft after FY 1967 reflects two factors—the previously mentioned reduction from 15 to 12 air wing equivalents beginning in FY 1968 and the substitution of the more capable F–111B for other fighter aircraft on a less than one for one basis. . . .

In contrast to the fighters, the number of attack aircraft will have increased substantially by the time the transition to the 12 equivalent air wings is complete. At that point, the attack aircraft force will consist of A–6's and the new A–7's. . . .

Inasmuch as the A–3 heavy aircraft are no longer required for the strategic mission, they are now being used as tankers to extend the range of "shorter-legged" Navy aircraft. . . .

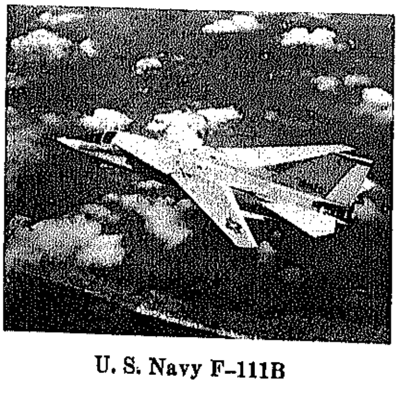
No significant changes have been made in the combat readiness training aircraft forces.

ASW and Destroyer Forces.

Three years ago, in recognition of the unsatisfactory state of our knowledge in antisubmarine warfare, I requested the Navy to undertake systematic, long-term studies of all of the related aspects of the problem. From these studies has come a much better understanding of both the character and extent of the threat and the capabilities of the forces required to cope with it. As a result, it now appears that some additional changes should be made in our ASW program. These involve the size of our ASW carrier forces, and the substitution of land-based patrol aircraft for the seaplanes. . . .

ASW Carriers. We now have eight Essex-class ASW carriers, one of which, the Intrepid, is temporarily operating as an attack carrier in support of Southeast Asia operations. Our studies show that compared with other ASW forces, the CVS ASW Group is a high-cost system in relation to its effectiveness; the annual operation cost of a CVS is about $32 million, including about $17.5 million for the aircraft complement.

As the newer ASW systems—the SSN's, the DE's, the P–3 patrol aircraft, etc.—join the Fleet in increasing numbers, the relative value of the ASW carriers will continue to decline. Accordingly, we now propose to reduce the force somewhat when the conflict in Vietnam ends.



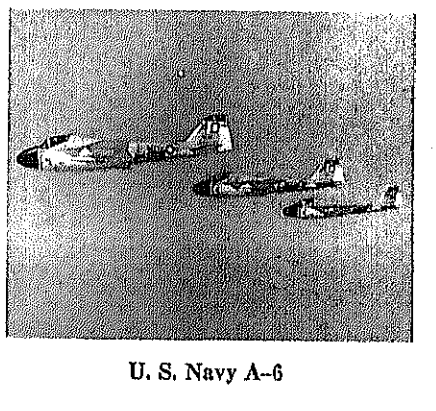
U. S. Navy F–111B

The older SH–34 helicopters on CVS's have already been replaced by the new SH–3, and the CVA's are now also being provided some of these helicopters.

The older S–2's will have been completely replaced by the newer S–2E's by the end of FY 1967. While full scale development and procurement of a replacement aircraft should not be undertaken until the role of the CVS in the overall ASW effort of the 1970's has been clarified and until the need for a more sophisticated capability has been clearly demonstrated, we have included funds for contract definition of a new aircraft (VSX) should further study warrant our going ahead with this program.

In addition to its ASW aircraft, each CVS is authorized a few A–4's in order to provide a limited intercept and air defense capability. Finally we will continue to maintain eight squadrons of carrier-based ASW search aircraft and four squadrons of ASW helicopters in the Naval Reserve forces for the four CVS's we plan to retain in the Reserve fleet.

Attack Submarine Forces. By the end of the current fiscal year the submarine force, excluding Polaris, will number 105 submarines, 32 of which will be nuclear powered. We have continued to encounter difficulty in getting the SSN program on schedule, principally because of the Submarine Safety Program and a shortage of skilled workers. As a result we will have a few less SSN's in the force at end FY 1967 than planned last year but we hope to make up most of this shortfall next year. In the meantime, we propose to offset this slippage by delaying the phaseout of an equivalent



U. S. Navy A–6

number of conventionally powered submarines.

As I pointed out last year, a force of about 64 "first class" SSN's would be needed. . . . Five SSN's were provided by the Congress in FY 1967, leaving a total of six SSN's still to be funded. We now propose to start three more SSN's in FY 1968 and three in FY 1969. This program will give us a total of 64 first class SSN's, plus four other SSN's which could be used together with the conventionally powered submarines for other ASW missions. If our continuing study of the ASW problem should indicate that additional SSN's are required, we can add to this program next year.

Originally, we had intended to modernize 12 conventionally powered submarines (Korean War vintage or later), including provision of improved sonar. Last year, when it became apparent that these sonars were not going to be available in time, we decided to go ahead with the modernization of the first five submarines without the sonar improvements. It now appears that the new sonar components will still not be available for installation in the remaining seven submarines in FY 1968. Moreover, other modernization costs have risen to the point where we now believe that it is no longer practical to proceed with the program. Accordingly, the plan to modernize these seven submarines in FY 1968 has been dropped.

In the Submarine Direct Support category, we propose a phased replacement program for our present submarine rescue ships (ASR's). . . . Therefore we tentatively propose to construct five new ASR's over the next few years. These new ASR's will have catamaran (i.e., twin) hulls and provide much greater deck space, including a helicopter platform, and better sea-keeping qualities than the present ships. They will be capable of operating two rescue submersibles and supporting divers at great depths for prolonged periods. We are requesting $17.7 million for the ASR in FY 1968.

In addition to the 10 ASR's, which we plan to maintain throughout the period, the Submarine Direct Support force includes six submarine tenders (AS) and nine auxiliary submarines (AGSS). Two new submarine tenders are tentatively scheduled to be constructed in future years.

ASW Escorts. The requirement for ASW escorts can be met by several different types of ships most of which are also capable of performing other missions such as patrol, fire support and anti-air-warfare. In planning for our future ASW escort forces, all ships with an ASW capability are taken into account. However, only the destroyer types without a SAM capability are included under the ASW category; the SAM ships will be discussed later. . . .

Two years ago we proposed a phased replacement program for the destroyer escort force. In accord with that plan, $298 million has been included in the FY 1968 request for 10 more of these ships. . . .

With respect to the years beyond FY 1968, it now appears that substantial construction and operating economies could be achieved with a newly designed ship (tentatively designated the DX) employing the "total package" procurement concept and a large multi-year buy. It may also be possible to use the same approach and the same or a similar design for a new class of guided missile ships (tentatively designated the DXG). Accordingly, we propose to initiate a new program which would provide for:

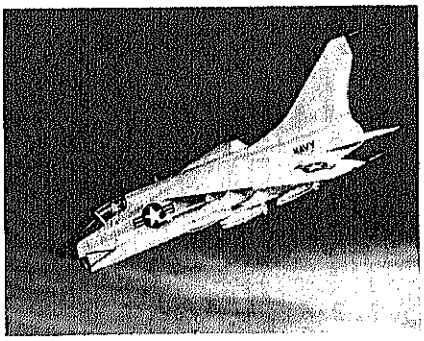
- Standardized design and serial production of a sizable quantity of identical ships in order to minimize total procurement cost.
- Incentive to the contractor to design a highly automated ship requiring minimum manning in order to reduce operating costs.
- Standardization in order to reduce logistic support costs.
- Possible standardization/integration of the DX and DXG in order to maximize further advantages of standardization and serial construction (e.g., both ships might have the same hull and differ only in their weapon systems, or perhaps their hulls could have common bow and stern sections with separate mid-sections for each type).
- Possible use of modular design concepts so that major components (e.g., specific weapon systems) could be installed and removed *en bloc,* facilitating both repair and future modernization.

We have included $30 million in the FY 1968 Budget to initiate concept formulation and contract definition of the DX/DXG. At the conclusion of the contract definition phase the entire program will be reevaluated in the light of the detailed designs and cost estimates which result.

We are also continuing to improve the SQS-23 sonars on most of the earlier DE's and on a large number of DD's, guided missile destroyers (DDG's), and cruisers (CG/CGN's). . . . About $18 million was programmed for this purpose in FY 1966, about $11 million in FY 1967, and we are requesting another $24 million in FY 1968.

As I described a year ago, we are taking steps to improve the ASW capabilities of 13 remaining D-931 class destroyers, all of which are less than twelve years old. We are providing them with ASROC, improved communications, a new variable depth sonar (VDS), improved ECM capabilities, the improvement to the SQS-23 sonar, a modern ASW combat information center, etc.—at a cost of about $14 million each. Since the VDS equipment will not be available this year, the ships are being rewired now to accept it later when it does become available. With these improvements, the 13 remaining DD's should offer comparable, and in some ways even better, ASW performance than the new DE's we are building.

Originally, having funded one in FY 1964, we planned on five of these DD-931 conversions in FY 1966 and five this year, with the last three scheduled for FY 1968. However,



Artist's Concept of U. S. Navy A-7A

because of equipment procurement problems, we have rescheduled the program. We have one in conversion now and plan to start three conversions this year, seven more in FY 1968, and the last three in FY 1969.

Patrol Aircraft. While we still plan to maintain a total of 30 squadrons of ASW patrol aircraft, we now propose to phase out the three remaining squadrons of seaplanes (SP-5) and retain, instead, three squadrons of SP-2 land-based patrol aircraft. One squadron will be converted this year and the other two in FY 1968. This change will permit us to decommission the three remaining seaplane support ships (AV's) and thereby save $17 million per year in operating and indirect costs, with no reduction in our overall ASW or surveillance capability. Except for these three squadrons, all the SP-2's will be phased out of the active ASW patrol forces over the next few years and replaced with 27 squadrons of the new P-3's. (Ten squadrons of SP-2's will be retained in the Navy Reserve.)

Beginning in FY 1968, all new P-3's will be procured with the A-NEW avionics system and when the force buildup is completed we will have nine squadrons so equipped. . . .

Multi-Purpose SAM Ships. The multi-purpose surface-to-air missile (SAM) ships provide an important part of the Fleet's anti-air warfare (AAW) capability. As I described last year, our current program objective for the SAM force is 79 ships. . . . By the end of FY 1967 the SAM ship force will consist of 70 ships, three of them nuclear powered.

Last year Congress added funds to our original budget request for construction of a nuclear-powered frigate. As you know, we did not recommend the inclusion of such a ship in our FY 1967 program. However, we have decided to proceed with construction this year, . . .

I am also again recommending the construction of two guided-missile destroyers (DDG's). . . .

The new DDG's and DLGN would have significantly improved AAW and ASW capabilities compared with present SAM ships, particularly in a hostile ECM environment. . . . They will employ the new Standard missile and be equipped with the latest ASW equipment, the Navy Tactical Data System, and the improved SQS-26 sonar. Provisions would, of course, be made to incorporate new systems and technologies as they become available, and space will be provided for this. Some $167 million is requested for the two DDG's in FY 1968.

In addition, we are continuing the SAM Improvement Program, under which the Standard missile is now being procured to replace both Tartar and Terrier. . . .

Last year I mentioned that we were studying the feasibility of providing a "close-in" or "point" air defense capability for other types of combat ships. We now propose to procure and install a basic Point Defense Surface Missile System (PDSMS) on ships which are not likely to encounter the more sophisticated forms of air attack and which do not generally operate in the company of regular SAM ships—e.g., amphibious assault ships and destroyer types operating independently near hostile land areas. This system makes use of existing hardware (e.g., Sparrow III missiles) and can be installed on existing gun mount foundations. . . .

About $14 million has been included in the FY 1968 Budget for the first procurement.

Other Combatant Ships.

At end FY 1967, there will be 23 ships in the Small Patrol category. These ships are used for coastal surveillance and patrol boats (PTF's) costing $17 million have been added to the FY 1967 program.

The primary mission of fire support ships, also included in this category, is to provide a heavy concentration of ship-to-shore fire during amphibious assaults. . . . the Navy is presently studying the feasibility of a new type of landing force support ship which would combine the fire support capabilities of the cruiser's heavy guns and the rocket ship's saturation fire.

Amphibious Assault Ships.

Last Year I informed the Committee that while our objectives of achieving a modernized (20-knot) amphibious lift for one and a half Marine Expeditionary Forces (MEF, or division/wing teams) and sufficient older ships to provide a slower lift for another half of a MEF remained the same, further study of the composition of the force had convinced us that some modification of the future construction program was desirable. I also noted that the Navy was investigating the possibility of designing a multi-purpose ship which could combine the features of several different types of amphibious ships and that one of the reasons we had rescheduled the program was to provide time to develop a design for this new ship. . . .

. . . Unfortunately, experience has shown that our current LPD's are too small to be truly effective as a multipurpose amphibious ship in the assault role and they cannot by themselves serve as a replacement for a variety of specialized ships. For this purpose we need a bigger assault ship capable of landing, either by air or by sea, a much larger and more balanced land force than is now possible with any existing amphibious vessel, and this was the type of ship I mentioned last year.

Our further study of this problem indicates that the development of such a ship is not only feasible but highly desirable. On the basis of the Navy's preliminary design work, this amphibious assault ship, now designated the LHA, would be quite large (about 40,000 tons, compared with less than 18,000 tons for the LPD) and would have both a boat well and a helicopter deck. . . .

In view of these advantages, we now propose to substitute LHA's for a variety of specialized amphibious ships which we had previously programmed. The first of these LHA's has been included in the FY 1968 program. As in the case of the C-5A and the Fast Deployment Logistics ships, we plan to use the two-step contract definition, total package procurement technique for the LHA's, and $18 million is included in the FY 1968 Budget for contract definition, in addition to funds for the construction of the first ship.

One of the goals we hope to achieve in this program is a considerable reduction in operating costs. To this end the competing contractors will be encouraged to design this ship so that

it can be operated by significantly fewer personnel than previous ships of this size. . . .

Mine Countermeasure Force.

At the end of this fiscal year we will have a mine countermeasure force of 88 ships, composed of 64 ocean minesweepers (MSO's), 18 coastal minesweepers (MSC's), three mine countermeasures support ships (MCS's), and three other support ships.

In order to modernize this force and improve its mine countermeasure capabilities, we propose to undertake a major rehabilitation program for all the existing MSO's. . . . We propose to start the rehabilitation of nine MSO's in FY 1968, for which we are requesting $33 million.

Two years ago, we started a construction program for new MSO's. Four MSOs were funded in FY 1966, five more in FY 1967, and we are requesting $61 million in FY 1968 for the last seven. . . .

Last year we initiated a program to provide some of the Marine Corps assault helicopters (CH–53's) with a secondary mine-sweeping capability. . . . Modification of some of these helicopters to accept the sweep equipment was begun last year, and we plan to start more in FY 1968. This program will give our assault forces a significantly augmented minesweeping capability against less sophisticated mines at a total costs of only about $12 million.

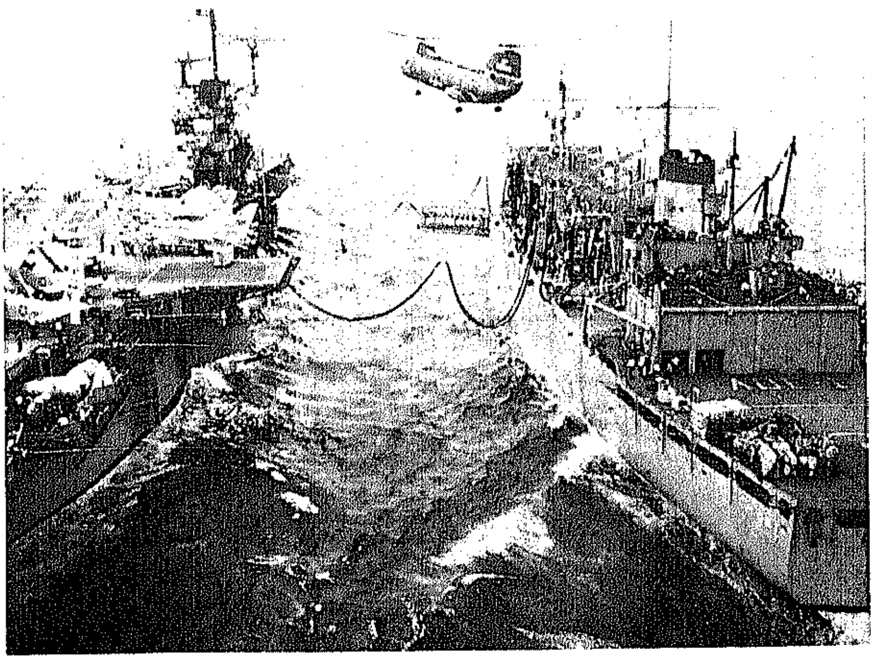
Logistical, Operational Support, and Direct Support Ships.

. . . In order to take advantage of modern re-supply methods and to complement the higher speeds of our latest ships, we have planned a long range construction program to rebuild the underway replenishment fleet. The FY 1968 program includes two AE's (ammunition ships) and one AOE (fast combat support ship) at an estimated cost of $137 million.

Marine Corps Forces.

The major Marine Corps ground and air units shown on the classified table provided to the Committee are essentially the same as those we projected last year. The temporary units added to support the Southeast Asia deployments include a fourth active division with its associated nine infantry, one tank, one amphibian tractor, and the equivalent of five artillery battalions, four Hawk air defense batteries, and two light observation and two medium transport helicopter squadrons. The permanent force remains at four divisions/aircraft wings (3 active and one reserve).

The Marine Corps fighter forces will be maintained at about the current level. . . .


Replenishment at Sea

The Tactical Air Control (TAC) force, which is used to locate enemy targets and then direct the attack aircraft to them, is programmed to remain at the present level. . . .

In the transport helicopter category, we now plan to maintain the currently augmented active force level through FY 1969, while simultaneously building our Reserve structure. When the Vietnam conflict ends the Marine Corps transport helicopter force will return to the planned permanent level. . . .

In the light helicopter and observation category the total number of aircraft will be increased significantly in FY 1968 through the temporary retention of 0–1's and UH–1's previously scheduled to phase out after the new OV–10's are delivered.

Last year we undertook a major program to increase the fixed-wing combat readiness training capabilities of the Marine Corps. This program will be continued. We also undertook at that time, on a temporary basis, a program of combat readiness training for Marine Corps helicopter pilots. . . . We now plan to make the combat crew readiness training program permanent and to expand the force level. Later, as the OV–10 enters the operating force, we plan to add some of these aircraft to the combat readiness training force.

The numbers of tanker/transport aircraft and of support aircraft are essentially unchanged from those presented last year.

Navy and Marine Corps Reserve Forces.

The Navy will continue to maintain a total of about 50 ships in the Naval Reserve. . . . As more modern ships become available from the active forces, older ships will be phased out.

The Navy also maintains a large number of ships in the Reserve (or "mothball") Fleet, in either Category B (BRAVO) or Category C (CHARLIE) according to their physical condition and readiness status.

As I noted last year, because of their relatively poor physical condition many of the CHARLIE ships would be usable only after extensive overhaul and modernization. Accordingly the Navy is continuously surveying these ships in order to identify those which have no further value. These ships are then scrapped

or otherwise disposed of. As a result, the size of the Reserve Fleet has been progressively reduced.

The Naval and Marine Corps Reserve air units are programmed for about 740 aircraft at the end of this fiscal year, and this number will be increased over the next few years. . . .

Navy-Marine Corps Aircraft Procurement.

The Navy and Marine Corps aircraft procurement program is shown on the classified table provided to the Committee. In order to meet the requirements of the Southeast Asia conflict and continue the planned modernization of the force, we propose to increase the FY 1967 program from the original 620 aircraft to 1,047, and to buy another 680 aircraft in FY 1968 instead of the 604 planned a year ago. . . .

With regard to the modernization of the attack carrier fighter forces, we still plan to initiate F-111B procurement in FY 1968. . . .

To provide for combat attrition beyond FY 1967 and complete the equipping of the Marine Corps fighter squadrons, we have increased the FY 1967-68 F-4 procurement programs substantially over the number previously planned. This will permit the replacement of the last Marine Corps F-8 squadron in FY 1968.

Since we plan to retain a number of F-8 aircraft in both the active Fleet (for the Essex-class CVA's) and the reserve forces for some time beyond FY 1968, we have decided to rework a substantial number of the latest models, providing them with new wings and other life-extension modifications. The program was initiated last spring, using about $17 million of FY 1966 funds; $70 million is included in the revised FY 1967 Budget; another $70 million is requested for FY 1968.

In the attack category we now plan to increase substantially the FY 1967-68 procurement program envisioned a year ago. We have added A-4F's and A-6A's to the FY 1967 program, and A-6A's to the FY 1968 program. The A-7 program for FY 1967-68 is about the same as presented a year ago.

Last year we had planned on buying the first 100 OV-10 aircraft for the Marine Corps in FY 1967. However, the need for certain design changes has delayed the award of the contract and has caused us to reduce the FY 1967 quantity. Additional OV-10's will be procured in FY 1968.

For the ASW mission, another increment of the P-3's with A-NEW will be procured in FY 1968.

To provide for the higher tempo of operations and future combat attrition in Vietnam, we are increasing our procurement of helicopters in FY 1967, and buying more in FY 1968.

In the Fleet Tactical and Mission Support category, we have added some C-130 radio relay aircraft to the FY 1967 program and canceled the previously planned C-2A procurement. . . .

The increase in planned pilot production from 2,200 to 2,525 per year will require the procurement of additional training aircraft. . . .

Accordingly, we have canceled the previously planned procurement of 72 T-28C's in FY 1966 and 58 in FY 1967, and instead we now propose to procure 36 T-2B's and 94 TA-4's in FY 1967, and 90 T-37B's in FY 1968. We have also included in the FY 1967 program 9 TC-4C's (a version of the Grumman Gulfstream) for navigator bombadier training. This will reduce the requirement for A-6A's now being used for this purpose.

For helicopter training we will be able to utilize UH-1E's as they are released by new OV-10's phasing into the force, thus permitting the cancellation of the 20 TH-1E planned for procurement in FY 1967. In addition, we plan to buy 40 new instrumented light turbine helicopters (LTH's) in FY 1968 to provide the increased training capacity mentioned earlier.

Other Navy Procurement.

In order to build toward our logistics obectives and to provide for projected combat consumption in Southeast Asia, we are requesting $1,389 million in FY 1967 (of which $164 million is included in the Supplemental request) for Navy missiles, ordnance, and ammunition; and $1,723 million more is requested in the FY 1968 Budget for this purpose.

Large quantities of air-to-ground munitions will continue to be needed in FY 1967-68. The largest single item in this category is the MK-82 500-lb. bomb. Other important items in the FY 1968 program are the 2.75-inch rockets, the 5-inch Zuni rockets, the 250-lb. bomb, Walleye TV-guided glide bombs and air-to-surface anti-radiation missiles.

For the surface-to-air missile ships which provide the Fleet's air defense, the Navy will procure only the new Standard missile beginning in FY 1968, although deliveries of Terrier and Tartar missiles will continue for some time. We are requesting $52 million in FY 1968 for both the medium range and the extended-range Standard missiles.

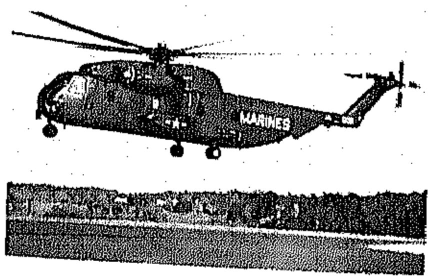
. . . Funds for the procurement of the final quantity of Talos missiles . . . are included in the FY 1968 Budget.

With respect to air-to-air missiles, we are buying both the Sidewinder and the Sparrow III in FY 1968. . . . We also propose to initiate pilot line production of the Phoenix missile in FY 1968.

In the ASW category, we plan to continue the procurement of ASROC and SUBROC in FY 1968. . . .

Last year I informed the Committee that the DASH ASW drone helicopter was encountering higher-than-expected peacetime attrition and lower-than-expected performance, and that we would review the entire program. As a result of this review, we have now decided to reduce the planned deployment of this system by about one-third. . . . This reduction in deployment will permit cancellation of the previously planned FY 1967 procurement.

Improved ASW torpedoes continue to be a major prerequisite to a more effective ASW force, and this category of weapons has continued to receive our close attention. . . . In an attempt to expand the production



U. S. Marine Corps CH-53A

base for the MK-46 and obtain the cost benefits of competitive procurement, we have opened a second production source. Although we have achieved the cost benefits (the torpedoes bought in FY 1966, for example, cost $124.3 million compared with the budget estimate of $179 million), it now seems clear that we will not achieve the production levels in FY 1967 originally expected. Accordingly, the FY 1968 procurement is adjusted to take this slippage into account.

Funds are also included in the FY 1968 Budget for the AN/SSQ-41 (Julie, Jezebel), an improved sonobuoy capable of employment in either an active (Julie) or passive (Jezebel) mode. . . .

Finally, a total of about $125 million is included in the FY 1968 Budget for 8-inch, 6-inch and 5-inch naval gun ammunition to meet the consumption requirements of Southeast Asia and continue the buildup of our stocks.

Marine Corps Procurement.

The FY 1967 Marine Corps procurement now totals $541 million, of which $253 million is included in the FY 1967 Supplemental. For FY 1968, a total of $715 million is requested. Included in the FY 1967 total is $231 million for munitions and ordnance ($114 million in the Supplemental); $463 million is included for this purpose in FY 1968.

The FY 1967 Supplemental provides about $70 million for the procurement of support vehicles such as ¼-, ½-, 2½-, and 5-ton trucks, and $39 million more is included for support vehicles in FY 1968. For tracked vehicles, $4 million is included in the FY 1967 Supplemental and $5 million in the FY 1968 Budget.

In the communications and electronics category, which includes such major items as radars and the Marine Corps Tactical Data System (MTDS), we have increased our FY 1967 procurement to $107 million, $29 million of which is included in the Supplemental request. Another $145 million is included for communications and electronic equipment in FY 1968.

Air Force General Purpose Forces

The Air Force General Purpose Forces shown on the classified table provided to the Committee are essentially the same as those presented a year ago, with the exception of certain changes related to our operation in Vietnam.

Fighter and Attack.

Our long range force objective in this category is the same as last year, namely, 24 wings of F-4's, F-111's and A-7's. In the near term, however, we now propose to make several changes in the force structure and procurement programs. For the most part, these adjustments are related to operations in Southeast Asia, in particular, the changes in our budget planning assumptions and the variations from the projected combat attrition rates reflected in our force planning last year. And, in a few cases, the proposed changes are the result of adjustments in production schedules.

The B-57's that we are using in South Vietnam will decline in number through FY 1968, after which they are scheduled to phase out of active service completely.

With respect to the F-100's, we had originally planned to phase down the active force to fewer aircraft by end FY 1967. However, attrition has been lower than forecast and we will have more squadrons in the force at end FY 1967 than we had previously planned. . . .

Last year we had planned to hold a large number of F-102's in the force through FY 1967 and then phase down considerably in FY 1968. However, in order to free F-4's for deployment to Vietnam, F-102's scheduled to phase out of the continental air defense forces were transferred to the tactical forces in FY 1966.

Last year we had planned to retain the two F-104 squadrons through FY 1967. However, we now plan to have only one squadron at end FY 1967 and phase this squadron out by the end of FY 1968.

The number of F-105's in the active force is projected to decline, and ultimately these aircraft will be phased into the Air National Guard.

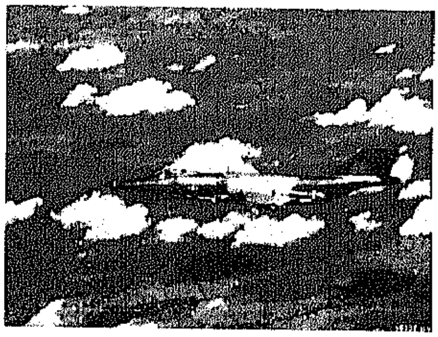
The F-4's are experiencing somewhat lower attrition than forecast last January and this will help the force to build up faster than planned. . . .

The F-111 activation schedule is the same as planned last year, except, for a small slippage in a few of the later squadrons.

Last year, in order to help diversify the Air Force tactical fighter force, we proposed the procurement of the A-7, a relatively inexpensive subsonic aircraft with good range, large ordnance-carrying capability, long loiter time, and good close ground support features. Our original deployment schedule called for activation of the first squadron in FY 1968 with more to be introduced later. However, this schedule was predicated on an early decision to proceed with the deployment of an afterburner for the Air Force A-7. . . .

Two considerations caused us first to delay and then change this decision. First, it appeared desirable, if possible, to find a new engine production source rather than add to the already crowded schedule of one of our principal engine manufacturers. Second, if a different, more powerful engine could be used, the load-carrying capacity of the A-7 would not have to be penalized by several hundred pounds of dead weight which the afterburner would involve. Such an engine, the Rolls Royce's "Spey," proved to be obtainable from Allison, who will produce it in the United States under license

U. S. Air Force F-4C



U. S. Air Force RF-101

from the British firm. The net result of this decision will be a more capable aircraft but a delayed delivery schedule for the first aircraft. However, a new, faster production schedule will still permit the achievement of the projected force by the originally planned date.

Tactical Reconnaissance.

The present long range objective for the tactical reconnaissance force remains the same as a year ago.

Because of anticipated Southeast Asia attrition and higher training requirements, the RF–101 force had been expected to decline by the end of the current year and then level off. In order to maintain that level, we will have to modify additional F–101's to the RF–101 configuration.

With respect to the RF–4's, the force will be built up to its full planned strength, although projected attrition in Southeast Asia will cause a slight delay in the scheduled build-up.

Ultimately, we will probably want to introduce a more advanced capability into the tactical reconnaissance force. To this end we initiated in FY 1966 a development project which would provide a reconnaissance version of the F–111. This development provides for the necessary equipment to be installed in the attack version of the F–111 with minimum modification to the aircraft. Through FY 1967, $25 million has been devoted to this effort and $2 million more is included in the FY 1968 requested. An additional substantial sum is included in our request for the initial procurement.

Tactical Electronic Warfare Support.

With the increasing importance of electronic warfare, underscored by our experience in Southeast Asia, we have decided to establish a separate Tactical Electronic Warfare Support (TEWS) force in the Air Force General Purpose Forces. This force will be composed of EB–66's converted from the RB/EB–66 aircraft previously shown in the reconnaissance category, and EC–47's (formerly RC–47's).

In order to provide sufficient aircraft for training, maintenance and advanced attrition, we plan to convert the RB–66's now in the force and WB–66's now in storage to the EB–66 configuration; this will involve some modification of the engines and provision of new ECM gear. A substantial sum is requested in the FY 1967 Supplemental for these modifications. Later, as advanced electronic equipment becomes available (e.g., from the Navy EA–6B program), it may be retrofitted into these aircraft.

Special Air Warfare Forces.

Since its creation in 1962, the Special Air Warfare (SAW) forces have grown both in size and in the range of missions performed. . . .

In order to meet the requirement of the Vietnam conflict, we have increased the size of the SAW force. This increase includes additional O–2's, AC–47's, C–123's, C–47's, and A–37's, partially offset by the reduction of A–1's.

Other Aircraft.

The Tactical Air Control System (TACS) provides the command and control capability for the tactical air commander in field operations. Currently, the Air Force is using modified 0–1 aircraft transferred from the Army for the Airborne Forward Air Controller (AFAC) mission in Southeast Asia. Last year, we had planned to convert this force completely to OV–10's by the end of FY 1968. However, during the past year the requirement for AFAC aircraft has virtually doubled and, as a result, the authorized TACS force has been increased. In addition, the OV–10 program has slipped and we do not now expect deliveries of that aircraft to the Air Force to be made as fast as originally planned. In order to build up the force as soon as possible, we have already taken action to procure an off-the-shelf Cessna aircraft designated the O–2. . . . With respect to the longer term, it is too early to make a final determination of the size and compositio of the TACS force, a matter we no have under study.

Combat Readiness Training.

As described a year ago, we wan to increase the size of the advance flying training base very significantl over what it has been in recent years Predicated on the assumption that the Southeast Asia conflict would end by 30 June 1967, this expansion was to have been substantially achieved by the end of FY 1968. Now, however, under our revised budget planning assumption, completion of the buildup of the training base in terms of aircraft would be delayed until the following year. . . .

Tactical Missiles.

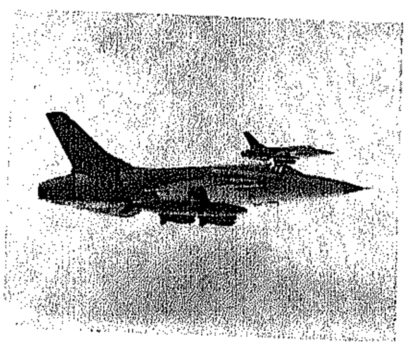
As I indicated last year, the remaining Mace B missiles (one squadron) deployed in Germany will be phased out as Pershing takes over the quick reaction alert (QRA) role. The remaining Mace B's deployed in Okinawa, however, are tentatively scheduled to remain in the active force through the program period.

Air National Guard.

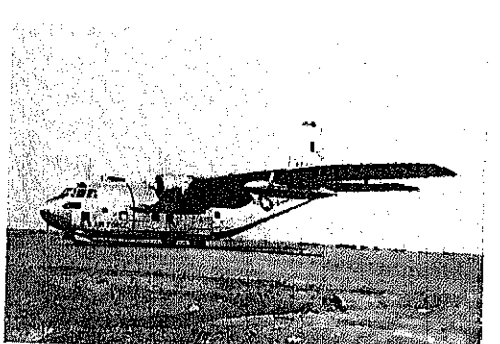
A number of changes have been made in the planned equipage of Air National Guard squadrons, most of them related to changes in the active structure. The Guard will retain more F–84's and F–86's longer in order to offset delays in the transfer of F–100's and F–105's from the active forces. The Guard will have 547 tactical fighters at end FY 1967 and this number is scheduled to increase modestly in future years.

Aircraft Procurement.

The Air Force will procure a total of 732 tactical, air control, and reconnaissance aircraft for the General Purpose Forces in FY 1967, at a total cost of $1,847 million. (Of this



U. S. Air Force F–105



U. S. Air Force C–123B

total, 102 aircraft costing $457 million are in the FY 1967 Supplemental request.) For FY 1968, 874 aircraft costing $2,076 million are requested for these forces. Both the FY 1967 and FY 1968 programs provide for combat attrition through the normal production lead time. Accordingly, if the Vietnam conflict should end before that date, both the active and reserve Air Force structures would be modernized faster than now projected.

Last year, we had scheduled procurement of a sizeable number of F–4 aircraft for FY 1967 and a final procurement in FY 1968. We now propose to increase the FY 1967 program and buy an even larger quantity in FY 1968.

With respect to the F–111A, we now plan to buy somewhat fewer aircraft in FY 1968 than we planned last year so as to be able to include certain improvements, which are now being made, in more of the aircraft. The aircraft deleted from the FY 1968 program will be added to the end of the line. . . .

The Air Force's A–7 program has, as I indicated earlier, slipped substantially from that projected a year ago. . . . The FY 1966 buy has been deleted and the FY 1967 buy reduced. For FY 1968 we plan to buy a large number of A–7's, and additional offsetting upward adjustments in procurement in subsequent years should permit us to achieve the planned force level by the originally scheduled date. . . .

Last year we had tentatively scheduled procurement of 157 OV–10's for the TACS force. However, the TACS requirement has grown sharply during the past year, leading to the decision to buy the O–2 and this, coupled with a delay in projected OV–10 deliveries and an increase in the cost of that aircraft, has caused us to revise our planned procurement program. Although we still plan to purchase 157 OV–10's for the TACS mission, the FY 1967 buy has been reduced and the difference added to the FY 1968 program. Further procurement of the OV–10 for the Air Force will depend upon a future decision to use it to help modernize the Special Air Warfare Forces.

As previously mentioned, action has already been initiated to procure 176 O–2A aircraft in FY 1967 for the TACS force and SAW force's program to provide for combat attrition replacement. . . .

More A–37 aircraft have been added to the FY 1967 program and still more will be procured in FY 1968. We also plan to buy more F–5's, principally to help modernize the Vietnamese Air Force.

Finally, to offset projected attrition of reconnaissance aircraft in Southeast Asia, the FY 1968 quantity of RF–4 aircraft has been increased and more will be procured later for advance peacetime attrition. And, as previously mentioned, to maintain the desired level of RF–101 squadrons, we will convert a number of F–101's to the reconnaissance configuration in FY 1968.

Other Air Force Procurement.

The Air Force's aircraft nonnuclear ordnance program for FY 1967 totals $1,739 million, of which $438 million is included in the Supplemental request. The proposed FY 1968 program totals $1,629 million. . . .

"Iron bombs," which are being consumed at high rates in Southeast Asia, will continue to dominate the FY 1967–68 procurement programs. For these two years, $1,400 million will be spent on these bombs, including 250-lb., 500-lb., 750-lb., and 2000-lb. bombs; $31 million is for napalm bombs and $463 million is for 2.75-inch rockets and 20mm ammunition. For certain special purpose ordnance, $888 million is requested.

Also included in the Air Force's FY 1967–68 program is $241 million for TV-guided Walleye's, anti-radiation missiles, and Sparrow air-to-air missiles.

Theater Air Base Vulnerability.

The theater air base vulnerability program is designed to minimize the damage an enemy could do to our overseas airfields, and the aircraft on them, in a non-nuclear attack. . . .

This year's request for $26 million will provide various vulnerability reductions measures (shelters, paving for dispersal sites, POL facility hardening, etc.) at a number of European and Pacific bases. The total program presently envisioned would ultimately provide shelter for a significant number of aircraft and other high-value aviation equipment, together with the full range of other vulnerability measures—at a total cost of about $178 million. I urge the Congress to provide the $26 million included in our FY 1968 request so that we may get started promptly on this critical program.

Tactical Exercises

Under normal peacetime conditions, large scale strategic mobility and tactical exercises contribute to the maintenance of high combat readiness, provide highly visible demonstrations of our capabilities, help test new operational concepts and weapon systems, and permit U.S. and allied forces to perfect coordination procedures which they would have to use in wartime. However, with the expansion of combat operations in Southeast Asia during the past 18 months, the importance of simulating such operations has dropped sharply and in FY 1966, only about $9 million was used for the larger exercises "directed" or "coordinated" by the Joint Chiefs of Staff. Therefore, on the assumption that the Vietnam conflict will continue through FY 1968, we have budgeted only $27 million for this purpose, far below the $100 million plus level of pre-Vietnam years.

Financial Summary

The General Purpose Forces Program outlined above will require total obligational authority of $35.4 billion in FY 1968.

A comparison with prior years is shown below:

	($ Billions, Fiscal Year)						
	1962 Act.	1963 Act.	1964 Act.	1965 Act.	1966 Act.	1967 Est.	1968 Prop.
Total Obligational Authority	18.0	17.9	18.0	19.1	29.5	34.3	34.4

Airlift and Sealift Forces

Included in this program are the Military Airlift Command transports, the Air Force's troop carrier aircraft assigned to the Tactical Air Command and the Unified Commands, the transport and troop carrier aircraft in the Air Force's reserve components, and the troop ships, cargo ships, tankers and "forward mobile depot" ships operated by the Military Sea Transportation Service.

Although not specifically included in the Airlift/Sealift Program, those elements of other major programs whose missions and capabilities are closely related to the general requirement for lift have also been considered in determining what forces should be provided here. These other elements include such specialized transportation forces as the carrier-on-board delivery aircraft of the Navy and the cargo aircraft of the Marine Corps.

Within the context of this specific program, the lift mission consists of two main tasks: the strategic requirement for transport support of military operations in overseas areas and the tactical requirement for intra-theater and assault airlift. The strategic task can be further divided into the requirement for the initial rapid military reponse to distant crises and the longer term requirement for continuing support and re-supply of overseas military operations. This distinction is very important because it helps determine what kind of equipment is needed, when it must be available, how it should be organized and deployed, and who should control it. As you know, during the past several years, our principal concern in the airlift/sealift area has been to build up a quick-reaction capability adequate to meet our global security commitments. More recently, our experience in supporting a major military deployment in Southeast Asia has focused our attention on the problems of providing lift support over the longer term, and especially under conditions when it is not feasible to requisition commercial shipping.

Strategic Movement

All of our studies show that the length and cost of a war, as well as the size of the force ultimately required to terminate it favorably, are importantly influenced by how fast we can bring the full weight of our military power to bear on the situation.

In previous posture statements I have discussed at some length the range of strategies available to us for meeting the requirement for such prompt and effective response to distant military contingencies. Basically, these choices range from reliance on large ready forces deployed overseas in advance of need, to reliance on a central reserve of men and equipment in the United States to be deployed by airlift and sealift as required. A strategy which combines features of both these extremes might provide for prepositioning equipment and supplies overseas, either on land or aboard ship, with the men to be airlifted in as needed. Although each of these approaches has its own advantages and disadvantages with respect to operational flexibility, foreign exchange costs, total manpower and equipment requirements, etc., the strategy of a mobile central reserve supported by an adequate lift capability and balanced prepositioning has long been accepted as the preferred alternative for meeting the rapid response objective.

During the past several years, the Defense Department has been embarked on a major effort to achieve the rapid deployment capability needed to support such a strategy. . . . Now, we are buying a new transport, the C-5A, which will enable us to make another major improvement, both qualitative and quantitative, in our strategic airlift capacity. Thus, when our presently planned six squadrons of C-5A's are all in the force in FY 1972, our airlift capacity will be more than ten times what it was in FY 1961.

Over the years, forward prepositioning of military materiel, especially heavy and bulky equipment, has grown in importance, partly because of the great increase in our ability to airlift forces and partly because of the emergence of new prepositioning concepts and equipment. The most important of these concepts has been the "forward floating depot (FFD)" in which balanced stocks of equipment and supplies are maintained on ships stationed overseas within a few days steaming distance of potential trouble spots, and thus very quickly available to "marry up" with airlifted forces from the central reserve. As a first generation "floating depot" system we planned to use old Victory-class ships, specially modified for this purpose. Three of these ships were actually deployed in FY 1963 and we had planned to add more this year. However, the requirements of the conflict in Southeast Asia have now caused us to defer this deployment for the time being.

Our future plans call for this first generation system to be replaced by a new class of ships, the FDL's, which are being specifically designed to support a rapid deployment strategy. Unlike the relatively slow (16 knots) and small payload (2,265 short tons) Victory ships, the FDL's will be fast, large payload (8–10,000 short tons) ships capable of rapidly delivering cargo either over-the-beach, using embarked lighters and helicopters, or at established ports. Because of these improvements, the FDL's will provide a wider range of operational flexibility than the Victory's. While we would probably always want to have some of them fully loaded and deployed forward, some of them could also be held partially loaded with ammunition and supplies but in a ready status in either U.S. or overseas ports where vehicles, helicopters, etc., tailored to the mission, could be placed on board quickly as the situation requires. This mode of operation, which is feasible only because of the speed and efficiency of the FDL's, would allow us to meet the desired rapid deployment schedules without immobilizing indefinitely large amounts of high cost equipment, some of which also requires substantial continuing maintenance. In either mode of operation, however, the FDL's would have to be committed to the rapid deployment mission at all times and would not be available for regular point-to-point service. Thus, while they will make an enormous contribution to our rapid deployment capability and will also be highly

efficient carriers for resupply after the initial deployment phase, these FDL's in themselves do not provide the answer to the overall sealift problem.

Indeed, all of our study and experience shows that the requirement for sealift continues to grow after the initial buildup phase, as more forces are deployed and stocks of consumables have to be replaced. To meet this larger and longer term need, we must rely in large part on merchant shipping. Based on the transportation requirements implicit in our contingency planning for a number of the most likely limited war situations, it appears that the equivalent of up to 460 general cargo ships (averaging 15,000 MT capacity, 15 knot speed) might be needed in a future emergency, over and above those available in our own Airlift/Sealift Forces. Simply in terms of size, the U.S. Flag Merchant Fleet (active and reserve) is adequate for such contingencies now, and should continue to be so in the future. The real problem, underscored by our recent experience in supporting our Southeast Asia deployments, concerns the availability of these U.S. Flag merchant ships to the Defense Department on a timely basis.

For the past year and a half, we have been engaged in a massive sealift of men and supplies to Vietnam. In the first quarter of FY 1967, the Military Sea Transportation Service (MSTS) exceeded its FY 1965 average quarterly shipping rate by 165 percent. However, only about a third of the increase was obtained from the U.S. liner fleet (both subsidized and unsubsidized). These, of course, were the ship operators who had been given preference in carrying peacetime Defense cargoes, who up until recently (when MSTS introduced competitive bidding) had collectively negotiated freight rates with MSTS, and on whom Defense had traditionally counted for the "hard core" of its sealift augmentation in wartime. But, when the heavy demands for sealift to Southeast Asia began to develop, most of the liner operators chose to continue to ply their normal commercial trade routes, and in the July-September 1966 period only eight percent of the subsidized fleet and something less than 10 percent of the non-subsidized liner fleet were under charter to MSTS. This choice was understandable under the circumstances. In a total war, neither the Government nor the shipline operators would have any choice, the ships would be requisitioned. But in a limited war, such as Vietnam, the issue is not as clear; the shipline operators, understandably, don't want to lose their place on the world trade routes and the Government doesn't want to be forced to requisition the ships it needs.

Fortunately, in the present situation, we have been able to obtain the needed sealift without recourse to requisitioning, principally through the use of the unsubsidized tramp fleet and through reactivations from the reserve fleet (NDRF). Almost two-thirds of the increase in Defense sealift capacity achieved since the start of the Vietnam buildup has come from these sources. . . .

While these resources have successfully met the needs of the present emergency, they may not all be available in another emergency a decade hence. By 1975, most of the ships in the NDRF will be 30–35 years old and will require larger expenditures for conversion to assure satisfactory reliability. Moreover, the unsubsidized tramp/irregular fleet will probably have disappeared because its aging World War II vessels cannot be replaced at an economical price. As a result, the Defense Department may in another emergency be far more dependent on the subsidized berth line operators than it is today.

The greater requirement for berth line ships is disturbing not only because of the problem of responsiveness but also because of the cost implications involved. We know from past experience (and we cannot realistically expect it to be otherwise) that, unless the operators are assured a good profit (at prices established in a tight market), their ships will not be forthcoming voluntarily in an emergency. This makes the subsidized liner fleet a very costly form of sealift for the Defense Department to hire, just when it needs it most.

Furthermore, U.S. Flag ships are twice as expensive to operate, even in normal times, as most foreign flag ships. And, as I mentioned earlier, ship construction in U.S. yards costs about twice as much as that abroad. To offset these cost differentials, the U.S. Merchant Marine is subsidized by the taxpayer, directly and indirectly, to the tune of nearly three quarters of a billion dollars a year—on the premise that this shipping is required for potential national security needs. Yet, despite this large annual subsidy, virtually all our sealift needs since World War II have been met without requisitioning merchant ships. Moreover, it seems clear that the most likely requirements for sealift augmentation in the future will be associated with limited war situations like Vietnam, in which recourse to requisitioning will be as undesirable as it seems today.

In summary, from the viewpoint of the Defense Department, there is a firm requirement for reliable, responsive sealift augmentation for a wide range of limited war situations, a requirement which the present subsidized U.S. liner fleet, for various reasons, has not met. Various solutions have been suggested, ranging from a major increase in the subsidized U.S. Flag merchant fleet to a full scale program of reserve fleet modernization. I do not propose to offer a solution at this time; other agencies of the Government are also involved. I believe a way can be found to revitalize both the American shipbuilding industry and the U.S. Merchant Marine and make them both more truly competitive in the world markets—and I believe that these objectives, along with our military requirements, can be met at costs lower than those our nation is incurring today.

Airlift

The airlift forces currently planned through FY 1972 are shown on the classified table provided to the Committee. In the active forces, the C–5A deployment schedule is the same as that envisioned a year ago with the first two squadrons scheduled to become operational in FY 1970. The first operational aircraft were included in the current year's procurement program and $423 million is included in the FY 1968 request for the next increment. The total C–5A program cost (including research and development and facilities construction) is estimated at $3.4 billion. . . .

Last year we had tentatively scheduled the phase-out of the C–133

fleet from the active forces in FY 1971. However, in order to maintain the squadron integrity of the Military Airlift Command's force structure, we now plan to phase out the last two squadrons of C–133's as the last two C–5A squadrons become operational.

We also plan to retain one additional C–124 squadron (16 UE aircraft), previously scheduled to be phased out this year, through FY 1968. . . .

The C–141 force will reach its planned strength of 14 squadrons in FY 1968 and is scheduled to hold at that level throughout the program period.

Before the end of FY 1967, we plan to reorganize the existing C–130 fleet within a force structure of 28 squadrons rather than the 31 previously planned. . . .

As a result of an Army-Air Force agreement in April 1966, which redelineated certain air support mission responsibilities within the combat theater, the Army's CV–2 Caribou transports (redesignated the C–7A) have now been transferred to Air Force operation and are, therefore, accounted for in this program for the first time.

No major changes are contemplated in the airlift force structure of the reserve components from that proposed a year ago. In FY 1968, we proposed to continue one C–121 squadron and one more C–97 squadron than planned last year. . . . Eventually, the reserve airlift force will consist entirely of C–130's. During FY 1968, we propose to continue the 100 percent manning for the 11 Air Force Reserve C–124 squadrons, which was inaugurated as a readiness measure in the summer of 1965.

Sealift

As discussed earlier in this section, we propose to build a fleet of Fast Deployment Logistic (FDL) ships. The Congress approved funds ($67.6 million) for two of these ships in FY 1966, including $10 million in the FY 1966 Supplemental for the initiation of contract definition. As I explained a year ago, actual contracts for these first two ships are being deferred in order to permit their inclusion in the "total package" contract. We now plan to award the multi-year contract late this fiscal year. Funds for five FDL's are included in the FY 1968 request. . . .

The FDL's we now propose will be considerably larger, faster and more efficient ships than those we originally envisioned. Two years ago, the preliminary FDL concept called for a vessel capable of carrying about 5,600 tons of division equipment and supplies; the ships we are now considering will be able to carry perhaps twice that tonnage and at an estimated increase in the cost per ship of less than 10 percent.

As I noted earlier in the discussion of the shipbuilding problem, the FDL program represents the first application of the concept formulation and contract definition process and the "total package" approach to ship procurement. The first phase of this approach, "concept formulation," was completed in July 1966 when three contractors were awarded definition contracts. During the first phase of contract definition, the competing contractors prepared their initial proposals around Army and Navy performance requirements and standards instead of detailed ship specifications. Thus, for the first time, the talents of private industry are being brought to bear on the initial design of the ship. During the second phase of the definition process, which has just been completed, the three competing contractors prepared detailed proposals for their design and a comprehensive program plan for their production. As part of these detailed proposals, each of the contractors has developed plans for a new shipyard or modernization of an existing one. Any one of these, in terms of efficiency, would be far superior to the existing U.S. yards and in terms of design and layout would be equal to the best of the foreign yards.

We are now in the last stage of the definition process, i.e., bid evaluation and source selection. . . .

The three Victory-class cargo ships which had been used as forward mobile depots since FY 1963 have been temporarily converted to point-to-point service in support of our current effort in Southeast Asia. Our plans now call for retaining these ships in this role through the end of FY 1968. Subsequently, with the end of the Vietnam conflict, we would expect to return them to their forward mobile depot role and add more ships for this mission. The Victory ship fleet would be retained until a sufficient number of the more efficient FDL's became available in FY 1972.

During FY 1966, MSTS operated in the nucleus fleet an additional general purpose cargo ship to help meet the increased requirements of our Southeast Asia operation. Tentatively, we now plan on retaining this ship through FY 1968, after which the active general purpose cargo fleet is scheduled to decline. Another minor change in last year's planned deployments resulted from the fact that one roll-on/roll-off ship which had been expected to enter service in May or June 1966 has been delayed.

With respect to special purpose cargo ships, the temporary Vietnam augmentations which I described a year ago have now been extended through FY 1968. In addition, MSTS will operate 13 more LST's in FY 1967 than envisioned last year and 14 more through FY 1968. After FY 1968, the special purpose cargo fleet is tentatively scheduled to return to the pre-Vietnam level. . . .

Financial Summary

The Airlift and Sealift Forces I outlined will require Total Obligational Authority of $1.6 billion in FY 1968. A comparison with prior years is shown below:

	($ Billions, Fiscal Years)						
	1962 Actual	1963 Actual	1964 Actual	1965 Actual	1966 Actual	1967 Est.	1968 Proposed
Total Obligational Authority	1.1	1.1	1.2	1.4	1.7	1.5	1.6

Research and Development

Included in this major program are all the research and development efforts not directly identified with weapons or weapon systems approved for deployment. We have made a special effort again this year not only to cull out marginal projects in the research and development program, but also to defer to future years all projects whose postponement would not have a serious adverse effect on our future military capabilities. But even while we have eliminated, reduced and deferred projects in some areas of this program, we have had to add, increase and accelerate projects in other areas, to meet new needs growing out of the conflict in Southeast Asia and the military situation generally.

Last year I described Project PROVOST (Priority Research and Development Objectives for Vietnam Operations Support) which we had established to ensure that the research and development program related to limited war situations, which had been accelerated in prior years, would be wholly responsive to the more specific requirements of our forces in Southeast Asia. As a result of PROVOST, projects totaling about $370 million were identified as having significant potential for Vietnam operations and were singled out for priority funding in FY 1966. During the past year, the test of combat in Vietnam has revealed a number of areas where still more effort appears warranted. These newly identified requirements have been an important influence in the formulation of our FY 1968 request. However, most of this work should be started promptly, and thus also concerns the current year's research and development program. While a portion of it has been financed by reprogramming or use of emergency funds, we have had to request an additional $135 million for research, development, test and evaluation (RDT&E) in the FY 1967 Supplemental.

Broadly speaking, the projects funded in the Supplemental can be grouped into three main categories. The first is concerned with improving the ability of our forces to fight at night. The second is concerned with reducing our aircraft losses. The third is concerned with the development of improved counterinfiltration systems. As described later, the proposed FY 1968 program provides for additional effort in all of these areas. . . .

Before I turn to the specifics of the FY 1968 Research and Development program, there are two general areas which might usefully be discussed as entities rather than in terms of the separate projects which they comprise. These are nuclear testing and test detection, and space development projects.

Nuclear Testing and Test Detection

As you know, the Defense Department, in cooperation with the Atomic Energy Commission (AEC), is maintaining four specific safeguards with relation to the Test Ban Treaty. For the Defense Department's portion of this program, we have budgeted a total of $255 million for FY 1968, compared with $224 million in FY 1967 and about $238 million in FY 1966, as shown on the classified table provided to the Committee.

In support of the first safeguard—the underground test program—we have included $49 million in the FY 1968 Budget, compared with the $33 million provided in the FY 1967 program. . . .

In support of the second safeguard—maintenance of modern nuclear laboratory facilities and programs in theoretical and exploratory nuclear technology—our FY 1968 Budget includes $63 million as compared with the $53 million in FY 1967. . . .

The FY 1968 Budget includes about $27 million in support of the third safeguard—the maintenance of a standby atmospheric test capability—about the same as FY 1967. . . .

In support of the fourth safeguard—the monitoring of Sino-Soviet nuclear activities—we have included a total of $116 million in the FY 1968 Budget, compared with $111 million in FY 1967. We conduct two principal programs to support this safeguard—the Advanced Research Project Agency's VELA program and the Atomic Energy Detection System (AEDS).

. . . The FY 1968 Budget includes $50 million for VELA activities. . . .

The present Atomic Energy Detection System (AEDS), designed to detect and identify nuclear detonations, now represents a facilities investment of about $85 million. . . .

About $58 million was provided in the FY 1964–67 budgets for this effort and $16 million is included in the FY 1968 request. An additional $46 million will be needed in FY 1968 for the RDT&E and operating costs of the system.

Space Development Projects

While the various elements of the Defense Department's space effort are spread, on a functional basis, throughout the program and budget structures, I believe this effort can be more meaningfully discussed as a separate entity.

The Defense Department's program is, of course, wholly integrated into the larger National Space Program, expenditures for which now total over $7 billion a year. The Defense portion is designed to maximize the utilization of space technologies and environments for defense purposes, e.g., to apply space technologies and capabilities to our strategic and tactical weapon systems to increase their effectiveness, to exploit the new potentials in information systems made possible by satellite-based communications and sensors, and to explore the usefulness of manned space systems for defense purposes. . . .

In total, about $1,998 million of our FY 1968 Budget request is for the space program, $328 million more than in FY 1967.

Spacecraft Mission Projects.

By far the largest project in this category is the Manned Orbiting Laboratory (MOL), for which we are requesting $431 million in FY 1968. . . .

A total of $83 million is requested in FY 1968 to continue work on Defense Satellite Communications programs and to procure, operate and maintain satellite communications equipment. . . .

Of the $83 million requested for Satellite Communications programs in FY 1968, about $17 million is for the development, procurement and operation of Army ground terminals; $13 million is for Navy shipboard terminals; and $49 million is for Air Force space subsystems, airborne ter-

minals, launch vehicles, and the costs of procuring and launching new satellites. In addition, $3 million is for the Defense Communications Agency for overall systems engineering and management direction.

I have already discussed the next item, "Nuclear Test Detection (VELA)," in connection with the Test Ban Treaty safeguards. The FY 1968 Budget includes about $8 million for this program.

We are requesting $18 million for the Navy's satellite navigational system. . . .

Research and development funding for the anti-satellite system program has been completed. The funds requested for FY 1968 will provide for the normal operating costs of the system.

The funds requested for space "Geodesy" will support programs by each of the Services as well as the Department of Defense's participation in the National Geodetic Satellite Program. . . .

Vehicle, Engine and Component Developments.

The Titan III family of space boosters has begun to enter the operational inventory. The first Titan IIIB (Agena configuration) was launched last July and production is now proceeding. The Tital IIIC has been in the flight test phase since June 1965 and is being used to launch the Initial Defense Communications Satellite, VELA, Tactical Communications Satellite, and multiple engineering payloads.

The funds requested for "Agena D" will continue work being initiated this year to increase the capability of the standard Agena D for the heavier satellite payloads now projected. . . .

The funds requested for "Spacecraft Technology and Advanced Reentry Tests (START)" will complete the present phase of this program. . . .

The funds requested for "Advanced Space Guidance" will support an ongoing program of studies, experiments and equipment development in such areas as long-term accuracy and reliability of inertial guidance components, horizon sensors and star and landmark trackers, and on-board determination of astronomical data for autonomous navigation. The FY 1968 program includes procurement of an inertial reference unit (which will serve as an instrumentation standard for the sensors) and other navigation components, which will then be flight tested.

The "Large Solid Propellant Motor" project was undertaken to create the technology base required for the development of missile or launch vehicle engines up to 156 inches in diameter. Funds already provided will be sufficient to complete the remaining tasks, i.e., demonstrations of a low cost nozzle, an advanced thrust vector control system, and a self-eject launch concept.

The next item, "Advanced Liquid Rocket Technology" comprises three projects: advanced storable liquid rocket technology; high performance, cryogenic liquid rocket technology; and maneuverable space rocket technology. . . .

Other Defense Activities Supporting the Space Program.

The Ground Support category shown on the classified table supplied the Committee is that portion of the costs of the missile range, test instrumentation, and satellite detection and tracking systems which is charged to space activities. The largest item in this category is the $132 million for the Eastern Test Range.

. . . The FY 1968 request includes $34 million for support of SPACETRACK and $5 million more for SPASUR, for a total of $39 million.

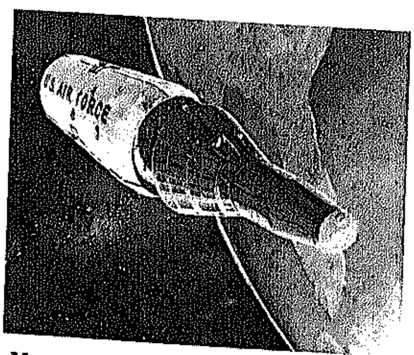
The $57 million requested for the "Satellite Control Facility" is for operation, maintenance and modification of the military space vehicle support network which provides satellite tracking, command and data handling, as required by the major Defense space programs. . . .

The last two categories on the table, "Supporting Research and Development" and "General Support," constitute the overhead of the military space program and consist of prorated portions of the costs of a wide range of space-related activities. . . .

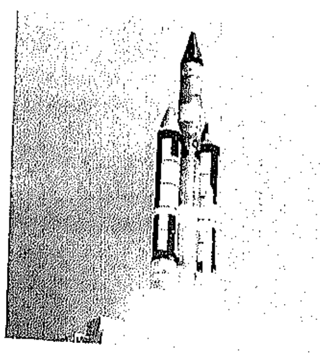
Research

Last year I discussed in considerable detail the problems involved in organizing and managing a Research program consisting of literally thousands of individual tasks and projects, most of which require relatively small amounts of money for their support. I pointed out that because of the large number and relatively small dollar value of these projects, we had to manage the program from my office on a "level of effort" basis, with the objective of advancing our knowledge in a balanced manner across the entire spectrum of science and technology pertinent to the Defense effort. To facilitate the management of the program and to insure that it is always responsive to changes in our fields of interest, I noted that we had organized the overall effort primarily in terms of disciplines, i.e., materials, general physics, chemistry, oceanography, etc., and that the effort in each discipline was allocated among the components of the Department on the basis of their primary fields of interest and competency. . . .

Shown on Figure 1 is the Research program proposed for FY 1968, compared with prior years. You will notice that there is a sharp reduction in the amount of funds allocated to Materials Research and to a lesser extent for In-House Laboratory Independent Research. In both cases, the amounts of unobligated and unexpended funds exceed the levels dictated by prudent management. Accordingly, the amount of new funds requested for FY 1968 has been reduced below the actual program levels which will be about the same as in FY 1967. . . .



Manned Orbiting Laboratory (MOL)



U. S. Air Force Titan IIIC

Included in the FY 1968 request for research is $27 million for the Defense Department's share of the national program for developing "New Centers of Excellence in Science and Technology". This program, previously referred to as the "University Program" and now called THEMIS, is in addition to our regular contract/grant arrangements with institutions of higher learning and is not a substitute for them. Rather, the new program is designed to create, eventually, about 100 new departmental centers of superior scientific and engineering competence at universities which are, at present, poorly supported. Patterned after the Joint Services Electronics Program, from which significant technical advances like the laser evolved, this new effort holds great promise of yielding a similar "pay-off" in the future.

We have initiated Project THEMIS this year at a level of $18 million, and have supplied interested colleges and universities with detailed information on our requirements. . . . Additional centers will be started in FY 1968.

Exploratory Development

Exploratory development is directed toward the expansion of technological knowledge and its exploitation in the form of materials, components and devices which it is hoped will have some useful application to new military weapons and equipment. Here the emphasis is on invention and on exploring the feasibility of various approaches to the solution of specific problems, up to the point of demonstrating feasibility with a "bread board" device and even, in some cases, prototype components and subsystems.

SUMMARY OF THE RESEARCH PROGRAM

Fiscal Years
(TOA, $ Millions)*

	1962	1963	1964	1965	1966	1967	1968
Engineering Sciences							
Electronics			26	27	28	28	27
Materials			34	44	45	47	33
Mechanics			25	26	29	29	28
Energy Conversion			12	14	14	15	14
Sub-Total			97	111	116	119	102
Physical Sciences							
General Physics			28	30	33	30	30
Nuclear Physics			15	17	15	16	13
Chemistry			10	11	11	11	11
Mathematical Sciences			33	35	37	38	37
Sub-Total			86	93	96	95	91
Environmental Sciences							
Terrestrial			6	6	7	6	6
Atmospheric			19	20	19	21	22
Astronomy-Astrophysics			8	9	10	10	9
Oceanography			18	19	19	20	22
Sub-Total			51	54	55	57	59
Biological & Medical Sciences			34	33	33	34	32
Behavioral & Social Sciences			9	10	12	13	12
Nuclear Weapons Effects Research			36	38	39	41	43
In-House Independent Lab. Res.			35	39	35	36	34
University Program (THEMIS)						18	27
Other Support				8	7	7	8
Total Research	339	351	346	383	391	416	409

* Amounts will not necessarily add to totals due to rounding.

Figure 1.

Along with research, exploratory development forms the technological pool from which future equipment will be designed.

The more than 800 individual exploratory development projects represent about 15 percent of the cost of the entire RDT&E program, with the average project requiring about $1.3 million annually. About 40 percent of exploratory development work is conducted by our "in-house" laboratories, 50 percent is contracted to industry, and the remaining 10 percent is performed by educational and non-profit institutions. A recent study of the origin of weapon system performance improvements has shown that almost all have resulted from Defense supported technological advances and very little from other sources.

As shown on the classified table provided to the Committee, we are requesting a total of $988 million for exploratory development in FY 1968, $65 million less than the revised estimate for FY 1967.

Army.

For the Army's exploratory development program, $216 million is requested for FY 1968, somewhat less than the level planned for FY 1967.

In the areas of electronics and communications, the development effort includes: small rugged field operated digital data processing equipment; communications equipment having increased traffic handling and improved anti-jamming capabilities; devices for rapid, positive and automatic recognition and identification among friendly surface units and between them and their supporting air units; new sensors for airborne and ground surveillance and target acquisition of enemy units on the battlefield; communication sets and variable time fuzes; night vision devices; improved solid state, thermionic and frequency control components common to a variety of equipments; etc. Efforts in the ordnance category include work on weapon systems for Army helicopters, the improvement of missile components, and development of conventional ammunition, weapons and explosives.

In the materials category, the Army is concerned with the development of new metals, ceramics, plastics and composite materials which can improve its firepower, mobility, armor and communications, with particular

pose Forces. . . . SAM–D is now in contract definition phase which will be completed this spring. We will then have to decide whether to proceed directly with development of an integrated system suitable for direct operational deployment, to limit development to a prototype system for feasibility demonstration, or to return to concept formulation. The second option would provide additional time to incorporate still more advanced technology and lead to demonstration tests. The first option would lead to full service tests. The funds requested will support any option. The major remaining task is to integrate into a working model a number of components, the feasibility of which has already been verified on an individual basis. The SAM–D program is closely related to the Navy's Advanced Surface-to-Air Missile System Program and the development of the respective subsystems and components is being fully coordinated by the two Services.

The $6 million of "DOD Satellite Communication, Ground" covers the Army's portion of the Defense Satellite Communications programs, which were discussed earlier.

The $20 million requested for "Nike–X Advanced Developments" will finance development of those advanced components whose lead times would not permit their incorporation in an early deployment of the system. This work fills the gap between the engineering development effort and the development of completely new hardware for possible use later.

The $5 million requested for "Anti-tank Weapons" will provide for the evaluation of new anti-tank missile concepts. Present efforts are directed toward identifying those system characteristics which together seem to offer the best chance of achieving an effective low cost anti-tank weapon.

The funds requested for the "Light-weight Howitzer" will support the development of a 155mm self-propelled weapon. Development of the system is being coordinated within NATO, with the United States, France, Germany and Canada all participating in designing the ammunition. . . .

The "Limited War Laboratory," for which $7 million is requested in FY 1968, is the Army's quick reaction research and development facility for counterinsurgency operations. . . .

The "Therapeutic Developments" program was initiated in calendar year 1965 in response to the drug-resistant falciparum malaria which was causing such a serious problem for our forces in Southeast Asia. The $11 million requested will continue the development and testing of new anti-malarial drugs. . . .

The next item, $12 million for "Power System Converters," consists of four major categories of projects directed toward the development of engines, transmissions, final drives, and related components for combat and tactical vehicles. These categories are: power conversion for track and wheel vehicles; multi-fuel, variable compression engines; spark ignition engines; and rotary combined cycle power systems.

The funding requested for "Night Vision" reflects the increasing importance of night operations in modern warfare. Among the many types of equipment now under development are starlight scopes, small portable radars and special goggles.

The last item on the Army's list, "Airborne Surveillance and Target Acquisition," is also in large part concerned with the problems of night operations. One of the major efforts in this program is aimed at providing a better night reconnaissance capability.

Navy.

The first item on the Navy's list, "V/STOL Development," represents the Navy's current participation in the tri-Service V/STOL program previously described.

The next item, "Airborne Electronic Warfare Equipment," for which funds are requested, is a multi-project effort aimed at developing active (jamming) and passive (signal interception) electronic warfare equipment r quired by the Navy.

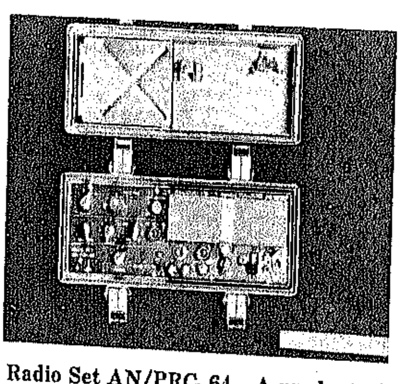
The "Advanced Surface-to-Air Mi sile System (ASMS)" is the new aut mated integrated air defense syste being developed as a possible replac ment for the Terrier–Tartar–Tal (3–T) systems. . . . As mentioned pr viously, we are seeking in this develo ment to maximize the use of the tec nology, components and subsystem developed for the Army's SAM–D sys tem. As a result, the ASMS progra must lag behind the SAM–D develo ment by about one year. With th completion of SAM–D contract defini tion in this fiscal year, we will be abl to decide which elements should b used on both systems. This will allow us to initiate ASMS contract definition by late FY 1968.

The funds requested for the "Ad vanced Point Defense Surface Missile System (Advanced PDSMS)" program will support the development of a replacement for the Basic Point Defense System (modified Sparrow III) now being deployed. . . . This development is being closely coordinated with the Army's Advanced Forward Area Air Defense System (AFAADS) program to maximize the common use of technology and components. The funds requested will support contract definition of the Advanced PDSMS in FY 1968.

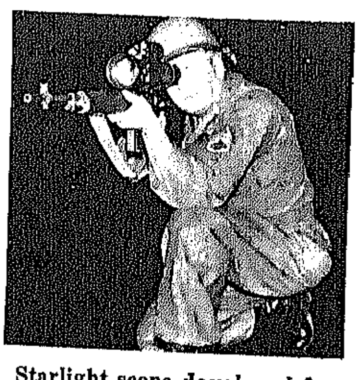
The funds requested for "Advanced ARM Technology" will support preliminary development work on advanced anti-radiation missiles.

The funds requested for the "Landing Force Support Weapon (LFSW)" will complete feasibility testing of the Army Lance missile adapted to a seaborne role for support of amphibious assault operations. . . .

The "Augmented Thrust Propulsion" program, for which funds are



Radio Set AN/PRC-64—A product of Limited War Laboratory program.



Starlight scope developed for night viewing.

requested in FY 1968, seeks to advance propulsion technologies for both strategic and tactical missiles in order to increase payload and/or range.

Grouped under "Astronautics" are several Navy programs, which I described earlier, relating to satellite communications and the potential use of navigation satellites by the tactical forces. We are requesting a total of $6 million for these programs in FY 1968.

The next group of items under Navy advanced developments are concerned with antisubmarine warfare (ASW) and the deep submergence program. The FY 1968 Budget includes a total of $356 million for ASW RDT&E, $126 million in advanced developments.

The first item, "Advanced Undersea Surveillance", includes three ASW surveillance projects.

The next two items involve the development of new sonars. The first, the "Advanced Submarine Sonar" program, consists of three efforts: a new submarine sonar, investigations in submarine acoustic communications, and the testing of a sonar for deep-diving auxiliary submarines. The "Advanced Surface Sonar" program provides for the development of a passive/active sonar to detect, localize, classify and track submarines (PAD LOC). . . .

The next item, $42 million for the "Deep Submergence Program", is one of the more important efforts in terms of its potential impact on future Navy programs. This program consists of three separate but closely interrelated projects: the Deep Submergence System Project (DSSP), Deep Research Vehicles (DRV), and Deep Ocean Technology (DOT). . . .

No further funding is requested for the "Combined Gas Turbine Propulsion" program, pending further study of the results achieved to date.

The "Active PLANAR Array Sonar" is concerned with the development of an experimental integrated ship sonar system. . . .

The "ASW/Ship Integrated Combat System" consists of two efforts: ASW Command and Control, and ASW Integrated Combat System (ICS). . . .

The next item, $13 million for "Reactor Propulsion Plants," will consist of three concurrent efforts in FY 1968: the development of a "natural circulation" power plant, a small combatant ship reactor, and a more powerful reactor for use in aircraft carriers. . . .

The "Advanced Surface Craft" consists of advanced development projects for three different types of surface ships, for which a total of $10 million is requested in FY 1968. The first effort, "Surface Effect Craft" (e.g., air cushion vehicles and captured air bubble ships), is to acquire the technology and design capability needed to build large high-speed "surface effects" ships. . . . In the second effort, "Hydrofoil Craft", we have built a 110-ton, 45-knot patrol craft (PCH) and have a 300-ton, 50-knot hydrofoil auxiliary ship (AGEH) over 90 percent complete. . . . The third effort, "Landing Craft", is concerned with the development and test of high speed amphibious and assault landing craft concepts. . . .

Air Force.

The first five items on the Air Force list of advanced developments are all part of the V/STOL technology program which was discussed earlier.

Last year, we programmed $3 million for FY 1967 to support preliminary work on a new "V/STOL Assault Transport." We have reconsidered the requirement for this type of aircraft and decided that it is premature to settle now on a specific design. Therefore, the project has been renamed "Light Inter-theater Transport" and will be concerned with the development of a new aircraft to replace eventually the CV–2 (Caribou) and similar small transports. The $2 million requested in FY 1968 will be used for preliminary study of possible designs including V/STOL aircraft.

The FY 1967 funds for "V/STOL Aircraft Technology" will, as previously described, support contract definition of a new V/STOL fighter aircraft, a project jointly financed with the Federal Republic of Germany.

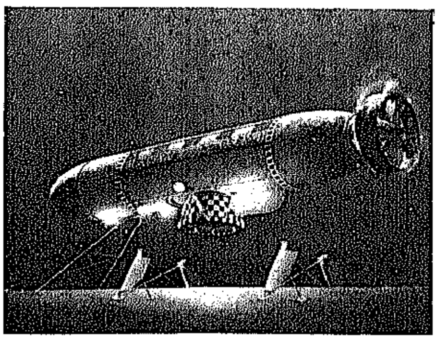
No further funding is required for the next item, "Lightweight Turbojet," which was principally concerned with demonstrating light turbine engines for V/STOL aircraft.

The $8 million requested for "Tri-Service V/STOL" development will continue operational testing of the XC–142A aircraft, as I noted earlier.

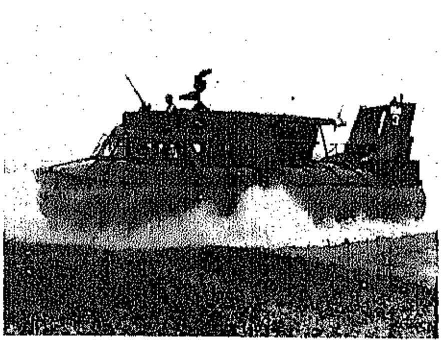
The next item, $20 million for "V/STOL Engine Development," will provide for the continued work on two engines, a direct-lift engine and a lift/cruise engine or for forward propulsion. . . .

The next two items, "Overland Radar" and "AWACS," were mentioned previously in connection with their potential application to future continental defense against bomber attack. . . . The funds requested for the "Overland Radar" program in FY 1968 will support continued flight testing of radar techniques for detecting and tracking airborne targets over land in the presence of severe ground clutter and provide for development of components for still more advanced radars for future generation air early warning systems. No additional funding is requested for AWACS in FY 1968 inasmuch as the radar evaluation is not yet far enough along to warrant going forward with contract definition during FY 1968. However, funds will be available to support continued concept formulation of the "AWACS" system and contract definition if progress on the program indicates this as the logical next step.

The next item, "Advanced Avionics," is concerned with improving the night and bad weather attack capabilities of tactical aircraft. Work will be con-



Deep Submergence Rescue Vehicle



Navy Patrol Air Cushion Vehicle

ducted on visual sensors, weapons delivery subsystems, navigation equipment (doppler, inertial, loran), and an integrated radome-radar for reconnaissance fighters. . . .

The funds requested for "Penetration Aids for Tactical Fighters" will support continued work on devices and techniques for existing tactical aircraft to enable them to operate successfully in hostile radar-controlled gun and surface-to-air missile environments. . . .

The funds requested for "Tactical Air-to-Ground Missile (Maverick)" would support contract definition and initiation of engineering development in FY 1968 of a new TV-guided air-to-surface missile.

For "Conventional Weapons" development, $5 million is requested in FY 1968. These funds will finance a number of projects designed to demonstrate the technical feasibility of advanced conventional munitions and air delivery systems, various carriage and release mechanisms, fuzing technology, etc.

The $8 million requested for "Flight Vehicle Subsystems" in FY 1968 will support advanced development effort in two areas vital to future aircraft design. The first project consists of collecting and analyzing air turbulence data with the objective of improving the design of aircraft structures and control equipment. The second project is concerned with demonstrating the ability of current flight control technology to reduce the effects of wind gusts, aircraft maneuvers, etc., particularly in low-level flight, in order to increase structural life and crew efficiency.

The $8 million for "Advanced ASM Technology" will support a program designed to provide a technical foundation for new and improved tactical air-to-surface missile guidance systems. The largest single project involves a new approach to the all-weather guidance problem.

The $3 million requested for the "X-15 Research Aircraft" program will complete in FY 1968 all of the Defense Department sponsored experiments now planned. Subsequently, NASA will assume full responsibility for funding the X-15 test program.

The next item, "AMSA" will require $26 million in FY 1968. (The $11.8 million added by the Congress for FY 1967 will be applied to the FY 1968 program). In FY 1968, we plan to carry on development of an engine that could be used in this and other advanced aircraft. Additional funds will be required for system integration of the avionics and to allow the airframe contractors to accommodate their designs to the engine development.

The $8 million requested for "Advanced Filaments and Composites" will support further work in developing new high strength, lightweight materials for use in aerospace structural and propulsion systems. . . .

The next item, "Advanced ICBM Technology," has now been reoriented from a "general" technology effort to the specific support of projects most likely to aid in the selection of subsystems for the possible new ICBM discussed earlier.

No additional funding in FY 1968 is requested for the next item, "Stellar Inertial Guidance." The PACE II, a highly precise inertial navigator developed with prior year funds, is now in its evaluation phase which is expected to extend into FY 1968. After review of these test results, future follow-on efforts will be determined.

A number of the other Air Force advanced development items are space projects which I discussed earlier.

Engineering Development

This category includes those projects being engineered for Service use, but which have not yet been approved for production and deployment.

Army.

A total of $422 million has been included in the FY 1968 Budget to continue development of the Nike-X on a high priority basis, as discussed in Strategic Forces section of this statement.

One of the Army's major research and development program objectives is to have a number of ground force weapon systems in various stages of development at all times. The next item, "Firepower Other Than Missiles," for which $49 million is requested, constitutes the bulk of the Army's effort in this area and is divided into three main categories: "Individual and Supporting Weapons;" "Field Artillery Weapons, Munitions and Equipment;" and "Nuclear Munitions."

The largest project in the first category is the Medium Anti-tank Weapc (MAAW), a shoulder-fired 14.5-l missile (28 lbs. including launchei with a shaped charge warhead. . . Other projects in the Individual an Supporting Weapons category incluc a series of new ordnance signalin devices which are being engineered i response to Southeast Asia requir ments and a new Vehicle Rapid Fi Weapon System, to replace the Cal. 5 machine gun and the interim HS-82 20mm cannon.

The "Field Artillery Weapons, Mu nitions, and Equipment" categor encompasses the development o sophisticated conventional munition and the resolution of ammunitio problems associated with Southeas Asia.

The "Nuclear Munitions" categor covers the development of Army sup plied components for nuclear projec tiles and atomic demolition munitions Present efforts are being directed to ward an advanced firing device fo demolition munitions, and fuzes an cases for an improved 155mm artiller round.

The "Aircraft Suppressive Fir Support System" project, for whicl $14 million is requested in FY 1968 is concerned with the developmen and adaptation of weapon subsystems for Army aircraft. . . .

"Other Airmobility Projects," fo which $6 million is requested, include work on aircraft engines, lightweight aircraft armor and aerial delivery equipment.

The next item, $9 million for "Surface Mobility," comprises three efforts: "Wheeled Vehicles," "Tracked Special Vehicles" and "Marine Craft." The major project in the first category will be the initiation of engineering development for the new 1¼-ton XM-705 truck as an ultimate replacement for the current M-37 truck in rear areas. The major project in the second category will be a new armored reconnaissance vehicle capable of operations in adverse terrain and the "Mechanized Infantry Combat Vehicle-70," a replacement for the current personnel carrier. The third category includes work on shallow draft boats, a beach discharge lighter, etc.

The $14 million for "Combat Surveillance and Target Acquisition" provides for a number of projects. The largest is the TACFIRE system in

which automatic data processing and display techniques will be used to improve the accuracy, response time and overall effectiveness of field artillery firepower. Contract definition will begin this year, with initiation of engineering development scheduled to take place next fall. Other projects include: improved sensors for the detection and location of enemy personnel, vehicles and weapons on the battlefield; airborne sensors for visual target location; a forward-looking infrared set for helicopters; image interpretation and photo processing equipment, etc.

The $21 million for "Communications and Electronics" provides for a broad based program to improve the Army's communication, avionics and electronic warfare equipment. . . .

Navy.

The first item on the Navy's list of engineering developments is the "Medium Range Air-to-Surface Missile (Condor)". . . .

The funds requested for the "Advanced Sparrow" will substantially complete this development.

The next item, "Three-T Systems Improvements," consists of the engineering work necessary to support the updating of the three-T missiles (Tartar, Terrier, Talos) through the development of replacement components designed to increase the performance of these systems. The $7 million requested for FY 1968 will support development of improved components for the Talos system's radar.

The $8 million requested for "Unguided/Conventional Air Launched Weapons" will support engineering development of a number of munitions projects: Snakeye II, a second generation retarded bomb; Fireye, an improved fire bomb using new napalm mixes and improved igniters; a hypervelocity tactical aerial rocket; an improved 20mm general purpose projectile, etc.

The next item for which we are requesting funds in FY 1968, "Multi-Mission Tactical Fighter (VFAX)," is for concept formulation of an advanced fighter aircraft. . . . Since both the Navy and the Air Force may require such a fighter, we are examining the feasibility of a joint development program. Both Services would use a power plant employing the lift/cruise engine technology.

The next five items on the list are all related to undersea warfare (USW), and total $76 million for FY 1968.

The largest single dollar item in FY 1968 will be the "ASW Aircraft Development (VSX)". . . . The funding level proposed will support continued concept formulation and development of long lead time components of this system in FY 1968.

The next item, the "MK-48 Torpedo," is designed for use by both submarines and surface ships. . . . The MK-48 is already under contract.

The funds requested for the "Directional Jezebel" will complete the development funding of a sonobuoy capable of providing the bearing of a target directly to ASW aircraft.

The "Other Undersea Warfare Projects" for which $19 million is requested, include, for example, a shipboard periscope detection radar, the development of antenna systems integrated into the submarine's superstructure, etc.

The "Carrier Based Airborne Tactical Control System (CBATCS)" is designed to provide a major performance improvement over the present system now carried by the E-2A. . . .

The $14 million requested for "Marine Corps Developments", will support a number of projects on electronic systems, weapons and vehicles for the Marine Corps. Included in this program are the Marine Corps' portion of joint-service research projects such as the medium and heavy assault anti-tank weapons (MAAW and TOW), which were mentioned earlier in connection with the Army's research and development program. Another project is the development of a new landing force assault amphibian vehicle, with equally good heavy surf capabilities but better land performance than present vehicles. In the area of electronics, the overall objective is more reliable and lighter-weight equipment, e.g., a new lightweight battlefield mortar locator being developed jointly with the Army. Other projects include an automated system for integrating air support activities into the Marine Corps tactical data system; improved nuclear, biological and chemical hazard detection equipment; and a semi-automatic electronic switching facility for use by tactical units in Southeast Asia-type environments—all of which are being developed jointly with one or more other Services.

Air Force.

Many of the Air Force's engineering developments have already been discussed in connection with other programs.

The XB-70 test program has been continued following the accident last June, using the one remaining aircraft. . . . We believe that all of the truly important objectives of this test program can be accomplished with presently available funds and no further financing is requested for FY 1968.

Development funding for the next item, the "J-58 Engine," was completed in the FY 1967 Budget.

The $20 million shown for the next item, "Interceptor/Fire Control System/Missile," will support redesign and engineering work on the AWG-9 Fire Control System and the AIM-47 Folding Fin Missile, provide funds for the reconfiguration of the YF-12 test aircraft for use as a test bed for these systems, and continue studies on the possible use of the F-111 or F-12 airframes as a basis for the next generation of interceptor aircraft. (The fire control system and missile system work would be applicable to either.)

The next item, "F-4 Improvements," reflects the cost of developing the internal 20mm nose gun for the F-4E. This gun is currently undergoing testing and no additional funds are requested for FY 1968.

The $33 million requested for "MARK II Avionics" will substantially complete the funding of this follow-on to the F-111A's current avionics suit. . . . A modified version of the MARK II will be incorporated in the FB-111.

The funds requested for the "Advanced Tactical Fighter (FX)," will support continued concept formulation studies on a new air superiority aircraft for possible introduction into the force in the mid-1970's. . . .

We are requesting funds for "Advanced Ballistic Missile Reentry Systems," which comprises a wide variety of efforts to provide new reentry vehicle technology for our strategic missiles and to improve our defense penetration techniques.

The $8 million requested for "Nike Targets" will provide launch site sup-

port at Vandenberg AFB for ABM targets launched into the Kwajalein area, and for certain Air Force modification development work on the target vehicles.

The funds requested for the next item, "Advanced ICBM," would, as mentioned in the discussion of our Strategic Forces, permit initiation of contract definition for a new strategic missile system in FY 1968, if that proves to be desirable. . . .

The funds requested for the "Adverse Weather Aerial Delivery System" will further develop components designed to give airlift aircraft the capability to navigate to, and air drop personnel and materiel at, specific locations in bad weather or at night without external ground based assistance. . . .

The remaining engineering development items on the Air Force list have all been discussed in connection with the Department's space-related projects.

Management and Support

Army.

The FY 1968 Budget includes $90 million for the support of the White Sands Missile Range. Test programs are conducted at this range for all the Services and NASA. Among the specific projects are the Air Force's Advanced Ballistic Reentry System (ABRES), the Navy's new Anti-Radiation Missile (based on the Standard SAM Missile), the Army's Lance, as well as NASA's Aerobee project. A major effort at this facility is the range instrumentation program, now in its third year, which will refine the data collected on the range, improve the data reduction capability, and augment the range communication system.

We are also requesting $44 million for the Kwajalein Test Site, operated by the Army. . . .

The $229 million requested for General Support covers the costs of all Army research and development installations and activities other than White Sands and Kwajalein. . . .

Navy.

The Pacific Missile Range, for which $68 million is requested in FY 1968, is responsible for range scheduling, communications, weather and meteorological services, and data reduction in support of assigned missile and space launch operations in the Pacific. . . .

The Atlantic Undersea Test Evaluation Center (AUTEC), located in a deep-sea canyon off the Bahamas, will consist of three separate test ranges for weapons, sonars and acoustic systems. The weapons range became operational October 1966; the acoustic and sonar ranges are scheduled for completion during FY 1967 and FY 1970 respectively. For AUTEC, $18 million is requested in FY 1968.

General Support for other Navy research and development laboratories and test facilities not chargeable to specific programs will require $310 million in FY 1968.

Air Force.

For the Eastern Test Range, $219 million is requested in FY 1968, approximately $13 million less than for the current fiscal year. . . . Future test activities will involve greater accuracies, larger payloads, and more complex reentry vehicles as well as more sophisticated missions. To meet these more demanding requirements, the funds included in the FY 1968 request will provide a capability for collecting improved trajectory evaluation data on new frequencies. The program will also provide for the operation of eight specially instrumented C-135 aircraft to support the activities associated with the Apollo programs.

About $89 million is requested for FY 1968 to support the Air Force Western Test Range which consists of a complex of range-instrumentation networks supporting Air Force, Navy and NASA launches from Vandenberg AFB, Point Arguello and Point Mugu. The program also provides for the operation of five Apollo support ships.

General Support, including "Development Support," will require $657 million in FY 1968. This item carries the major support of the Air Force Systems Command and its nation-wide complex of research, development and test installations, the construction of additional research and development facilities, and other support programs. It includes about $85 million for the cost of services provided under contract by organizations such as RAND, Aerospace Corporation, and the Lincoln Laboratory.

Emergency Fund

For the Department of Defense Emergency Fund, we are requesting the appropriation of $125 million and transfer authority of $150 million, the same as the amounts provided for FY 1967.

Financial Summary

The Research and Development Program, including the development of systems approved for deployment, will require about $8.0 billion in New Obligational Authority for FY 1968. A comparison with prior years is shown below:

	(Billions of Dollars)						
	1962 Act.	1963 Act.	1964 Act.	1965 Act.	1966 Act.	1967 Est.	1968 Proposed
R&D—except systems approved for deployment	4.4	5.2	5.4	5.1	5.3	5.4	5.8
R&D—systems approved for deployment	2.5	2.5	2.3	1.9	2.2	2.3	2.4
Total R&D	6.9	7.7	7.7	7.0	7.5	7.7	8.2
Less: Support from other appropriations	-.6	-.6	-.6	-.5	-.6	-.5	-.7
Total RDT&E (TOA)	6.3	7.1	7.1	6.5	6.9	7.2	7.5
Less: Financing Adjustment	-.9	-.1	-.1	—	-.2	—	-.2
Total RDT&E (NOA)	5.4	7.0	7.0	6.5	6.7	7.2	7.3

Other Major Programs

In last year's reorganization of the Five-Year Defense Program structure, we established four new major programs which, for purposes of this presentation, have been grouped together in this section.

Specialized Activities

Specialized Activities comprise those elements of the Defense Program which are directly related to the missions of the combat forces in the Strategic, General Purpose and Airlift/Sealift Forces Programs, but which for purposes of management are more logically handled within the context of homogeneous functional groupings of similar or complementary activities.

National Military Command System. The National Military Command System (NMCS) is the primary subsystem of the World-wide Military Command and Control System. . . .

The NMCS comprises the National Military Command Center (NMCC) at the Pentagon, the Alternate National Military Command Center (ANMCC), the National Emergency Command Post Afloat (NECPA), the National Emergency Airborne Command Post (NEACP), and the various communications networks linking these command facilities, the unified and specified commands and Service headquarters.

As part of our continuing effort to improve the NMCS, we have expanded the automatic data processing capability at the NMCC to handle the increased workload related to Southeast Asia operations and to provide support for the newly created Strategic Mobility staff in the Office of the Joint Chiefs of Staff. The FY 1968 Budget request provides funds for the further improvement of the data processing system, the information displays, and the related facilities and equipment. . . .

Communications. The communications category includes both the Defense Communications System (DCS) and certain non-DCS communications operated by the Military departments. . . .

Other Specialized Activities. The Specialized Activities program also includes the overseas administration and grant aid portions of the Military Assistance Program, and such other mission-related activities as weather service, oceanography, aerospace rescue and recovery, etc. Because the Military Assistance Program is not included in the legislation being considered at this time, only the last category of activities will be discussed here.

Weather Service. The Air Force and Naval Weather Services collect, analyze, predict and disseminate, globally, meteorological and geophysical information for the support of military operations, NASA's space program (including manned space vehicle reentries and recoveries), research and development missile test firings, and they conduct hurricane and typhoon tracking and forecasting, and collect nuclear debris air samples for the AEC in connection with the test ban treaty safeguards. . . .

Oceanography. This category comprises the activities of the Navy's Oceanographic Office, Defense support of the National Oceanographic Data Center and their related research aircraft and survey ships. . . . During the coming fiscal year, the Navy will significantly expand its oceanographic effort. For example, in the "broad ocean survey" program the range of data collected will be greatly increased.

At the end of FY 1966, nine oceanographic research and survey ships (three manned by Navy crews and six operated by MSTS) and two environmental prediction research aircraft were employed in the program. Seven of these are converted World War II ships but the other two are new oceanographic survey ships (AGS's) which entered the force during FY 1966. In FY 1967 two more new ships—oceanographic research vessels (AGOR's)—will be commissioned, increasing the force to 11 ships and making possible an expansion of the program. The AGS funded in FY 1967 should enter service in FY 1969. No new ships are being requested in FY 1968 for this "operational" program, although two oceanographic research ships are included in the budget for the Research and Development program with which this survey effort is closely integrated.

Air Rescue and Recovery. The air rescue and recovery program comprises the Air Force Aerospace Rescue and Recovery Service (ARRS), certain specialized forces of the Navy, and certain assigned forces of the Army and Marine Corps. . . .

. . . To provide increased air crew recovery capability in Southeast Asia, additional ARRS helicopters will be procured in FY 1967 and FY 1968.

Traffic Control, Approach and Landing System. The Traffic Control, Approach and Landing System (TRACALS) element encompasses those "common system" air traffic control facilities not provided by the Federal Aviation Agency. . . .

There are two prominent current programs. The first, the AIMS Program, is concerned with the addition of the Air Traffic Control Radar Beacon System, which provides positive identification and location of aircraft to all air traffic control radar facilities. The second is concerned with the replacement of current VHF and UHF air-ground-air communications systems in order to meet the more stringent requirement of 50 kilocycle spacing between channels in accordance with our agreements with other members of the International Civil Aviation Organization.

Nuclear Weapons Operations. This element covers the activities of the Defense Atomic Support Agency (DASA) which provides specialized staff assistance to the Secretary of Defense and the Joint Chiefs of Staff; operational, logistical and training support for the Military Services; liaison with the Atomic Energy Commission on weapons development and the planning and conduct of weapons effects tests; and management for the national atomic weapons stockpile. The nuclear weapons effects tests, themselves, as well as nuclear weapons research, are included in the Research and Development program and were discussed earlier. DASA's construction program for FY 1968 includes further shoreline protection work at Johnston Island.

Logistic Support

Logistic support comprises a wide variety of activities which cannot be readily allocated to other major programs or program elements. Included under this heading are the costs of moving passengers and carriers, the Military Sea Transportation Service, the Military Airlift Command and contract airlift; purchasing, storing and inspecting materiel; those parts of the industrial preparedness program (e.g., the provision of new industrial facilities and the maintenance of reserve facilities and equipment) not identified with elements of other major programs; and the major overhaul and rebuild activities for items which are returned to a common stock and cannot, therefore, be related directly to specific military forces or weapon systems.

Personnel Support

The Personnel Support Program comprises the training, medical and other activities associated with personnel, except for those portions of such activities which are integral elements of another program. . . .

Training.

The Defense Department's training establishment constitutes a vast and varied system, including at least 83 major military installations, designed to meet not only peacetime needs for militarily trained manpower, but also to provide the potential for rapidly expanding this force in periods of mobilization. Our total capital investment in these facilities exceeds $4.8 billion and annual operating costs run over $1.5 billion. On the average, nearly one-fifth of the active force is assigned to these centers at all times, either as part of the permanent training staff or as trainees. The rising cost of training in the FY 1966–68 period directly reflects the rapid buildup in the size of the military establishment.

Recruit Training. Recruit training (i.e., "basic" or "boot camp" training) is given every new enlisted serviceman to facilitate the transition from civilian life, to inculcate necessary standards of conduct and discipline, to provide initial weapons training, to ensure adequate physical conditioning and to foster motivation and Service *ésprit*. In total, recruit training loads are expected to decline slightly in FY 1968, following the rapid rise in FY 1966–67. We now estimate that about 920,000 men will enter basic training next year compared to about 995,000 now estimated for FY 1967. . . .

The FY 1968 request includes funds for two major expansions of basic training facilities. The Air Force plans to add 5,400 additional barracks spaces at its Lackland Military Training Center in Texas and about $17 million will be needed for this purpose in FY 1968. Construction of a third Navy Recruit Training Center on the site of the former Orlando AFB in Florida (which was previously transferred to the Navy for use as a training devices center in 1964) was initially funded in the FY 1967 Budget and $21 million more is requested in FY 1968. . . .

Technical Training. The Military Services train enlisted personnel for about 1,500 separately identifiable occupational specialties. . . .

Professional Training. Professional training encompasses primarily post-graduate level education in military and civilian schools, including medical training.

Among the military schools are the several Service command and staff colleges, the Service war colleges and the joint Service colleges. Each year, over 4,000 students, including foreign military officers and U. S. Government civilians, are educated at these institutions. . . .

Flight Training. Flight training is the most expensive type of instruction given by the Defense Department, in large part because of the very heavy investments required in trainer aircraft and facilities. Three factors have now combined to compound our flight training problem: the large numbers of World War II-trained pilots who are now coming to the close of their flying careers; the rotation requirements of the Vietnam conflict; and the rapidly increasing size of the Army's aviation program. To meet these increased pilot requirements, the FY 1968 Budget includes funds to increase the number of pilots being trained by the Services to an annual rate of approximately 13,500. Actual pilot production will not reach the higher authorized levels in FY 1968, however, since it takes up to 18 months to train a pilot. . . .

In the Air Force, the planned annual output of pilots has been increased to 3,492 compared with 2,956 in FY 1967 (including jet pilots trained for the Military Assistance Program). To help handle this increased training load, a ninth undergraduate pilot training operation will be opened at Randolph AFB.

The new planned Navy annual pilot production rate is about 2,525 pilots (including 100 for the Military Assistance Program and U. S. Coast Guard), compared with about 2,200 previously in FY 1967. Of the 2,425 earmarked for the Navy and Marine Corps, about 945 will be trained for jet aircraft, 830 for propeller aircraft and 650 for helicopters.

The Army's planned pilot production has been increased to 7,500 pilots per year (including 180 for the Military Assistance Program), compared with about 3,700 in the original FY 1967 Budget. About 90 percent of the new Army pilots will be trained for helicopters, up from about 50 percent in FY 1966. The Army will commission about 75 percent of its new pilot as warrant officers since their posi tions do not involve command respon sibilities. To help handle the large training loads in FY 1968, Hunte AFB in Georgia (which was sched uled to close in July 1967) has bee assigned to the Army and the presen flight training program at Fort Wol ters will be expanded.

To support the larger flight train ing programs, the revised FY 196 Budget and FY 1968 Budget re quests provide 582 trainer aircraf for the Army, 269 for the Navy, an 458 for the Air Force.

Service Academies. As you know we have been increasing the level o enrollment at the Military Academy over the past few years toward an ultimate goal of over 4,000. In FY 1968, enrollment will average abou 3,300 cadets. To help accommodate the larger student body, the FY 1968 Budget includes funds for a new 66-classroom academic building at West Point and for personnel facilities and utilities.

Enrollment at the Naval Academy (currently the largest of the three Service academies) in FY 1968 will remain constant at about 4,100. Construction funds, totaling $3 million, are requested for the modernization of an academic building at Annapolis, and for additional personnel facilities.

The Air Force Academy, which has also been gradually building up the size of its student body to an ultimate level of 4,000, will reach a total of 3,100 cadets in FY 1968. In addition, a Cadet Pilot Indoctrination Program, designed to encourage all physically qualified cadets to consider flight training upon graduation, will be instituted. . . . About $5 million is included in the FY 1968 Budget for construction of medical, training and other facilities at the Air Force Academy in FY 1968.

Medical Services.

Medical Services include those costs for medical and dental services not directly associated with military units in our other major programs, the costs of medical care for military dependents at non-military facilities, the costs of providing veterinary services, and the cost of operating various health service activities such as the Armed Forces Institute of Pathology. . . .

The FY 1968 construction program for medical facilities totals $161 million—the largest ever. It includes 27 new hospitals or additions to existing hospitals, together with a large number of other medical facilities.

* * * * * * * *

TABLE 1

Department of Defense

BUDGET SUMMARY

(Millions of Dollars)

	FY 1966	FY 1967 Basic	FY 1967 Supple-mentals	FY 1967 Total	FY 1968
Total Obligation Authority:					
Military Personnel	17,047	18,731	1,704	20,435	22,025
Operation & Maintenance	15,378	15,712	3,562	19,274	19,154
Subtotal—Operating	32,426	34,443	5,266	39,709	41,179
Procurement	22,595	18,080	6,306	24,386	24,013
Research, Devel., Test & Eval.	6,946	7,042	135	7,177	7,523
Military Construction	2,545	533	624	1,158	2,144
Family Housing	682	519	11	530	823
Civil Defense	105	102	---	102	111
Special Foreign Currency Prog.	---	7	---	7	16
Total—Military Functions	65,299	60,727	12,342	73,069	75,808
Military Assistance	1,163	888	---	888	621
Total—TOA	66,462	61,614	12,342	73,956	76,429
Less financing adjustments	−2,929	−1,676	---	−1,676	−1,400
Plus NOA for Revolving Funds	---	---	535	535	241
New Obligation Authority	63,533	59,939	12,877	72,816	75,270
Expenditures	55,377	58,300	9,650	67,950	73,100

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TABLE 2

Department of Defense

SUMMARY OF THE FY 1967 SUPPLEMENTALS

(Millions of Dollars)

Southeast Asia		
Military Personnel		1,364
Operations and Maintenance		3,311
Subtotal—Operating		4,675
Procurement:		
Ammunition	677	
Aircraft:		
Combat attrition	1,525	
Training and other	439	
Spares	996	
Other aircraft equipment	775	
Total Aircraft	3,715	
Vehicles	506	
Electronics and communications	581	
All other procurement	840	
Total change in procurement program	6,317	
Financing adjustments	−11	
NOA for Procurement		6,306
Research and development for limited war		135
Construction for Southeast Asia		624
Increase in Stock Funds		535
Subtotal—SEA		12,276
Other		
Pay increase already voted, military	340	
civilian	179	
Medicare and Homeowners Assistance, already voted	82	
Subtotal—amounts already voted		601
Total New Obligational Authority requested		12,877

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TABLE 3

Department of Defense
FINANCIAL SUMMARY
(Billions of Dollars)

	1961	1962 Original	1962 Final	1963	1964	1965	1966	1967 Enacted or auth.[a]	1967 SEA Suppl.	1967 Total	1968
Strategic Forces	---	---	11.2	10.5	9.3	7.1	6.8	6.7	.4	7.1	8.1
General Purpose Forces	---	---	18.0	17.9	18.0	19.1	29.5	26.8	7.5	34.3	34.4
Specialized Activities	---	---	3.0	3.7	3.9	4.2	4.7	4.7	.2	4.9	5.3
Airlift and Sealift Forces	---	---	1.1	1.1	1.2	1.4	1.7	1.1	.4	1.5	1.6
Reserve and Guard Forces	---	---	1.8	1.7	1.9	2.0	2.3	2.4	.2	2.6	2.8
Research and Development	---	---	4.4	5.2	5.4	5.1	5.3	5.3	.1	5.4	5.8
Logistics	---	---	3.8	3.7	3.8	4.0	5.3	5.0	1.3	6.3	6.0
Personnel Support	---	---	4.8	5.0	5.3	5.7	7.2	7.1	1.1	8.2	8.9
Administration	---	---	1.2	1.3	1.3	1.5	2.6	2.3	.7	3.0	3.1
Military Assistance Program	---	---	1.8	1.6	1.2	1.3	1.2	.9	---	.9	.6
Gross Total Oblig. Authority	---	---	51.1	51.7	51.5	51.4	66.6	62.4	11.8	74.2	76.6
Less Unfunded Retirement Pay	---	---	-.5	-.3	-.3	-.2	-.1	-.2	-.1	-.3	-.2
Net Total Oblig. Authority	46.1	44.9	50.6	51.3	51.2	51.2	66.5	62.2	11.7	74.0	76.4
Working Capital	-.4	-.2	-.4	-.4	-.3	-.2	---	---	.5	.5	.2
Other Financing Adjustments	-2.6	-1.0	-.8	.2	---	-.5	-2.9	-1.7	---	-1.7	-1.4
New Obligational Authority	43.1	43.7	49.4	51.1	50.9	50.5	63.5	60.5	12.3	72.8	75.3
Total Expenditures	44.7	44.7	48.2	50.0	51.2	47.4	55.4	58.9	9.1	68.0	73.1
Expenditures as % of GNP	8.8	---	8.9	8.7	8.4	7.3	7.8	---	---	8.9	9.0
TOA by Department and Agency											
Army	---	---	12.9	12.2	12.8	12.7	19.1	18.5	5.1	23.6	24.7
Civil Defense	---	---	.3	.1	.1	.1	.1	.1	---	.1	.1
Navy	---	---	15.1	15.1	14.9	15.3	20.0	18.5	3.5	22.0	22.4
Air Force	---	---	20.2	21.0	20.6	20.1	24.3	22.5	3.0	25.5	26.0
Defense Agencies	---	---	.3	.9	1.1	1.1	1.3	1.4	.1	1.5	2.0
Defense Family Housing[b]	---	---	.5	.6	.7	.7	.7	.5	---	.5	.8
Military Assistance Program	---	---	1.8	1.6	1.2	1.3	1.2	.9	---	.9	.6
Gross Total Oblig. Authority[c]	---	---	51.1	51.7	51.5	51.4	66.6	62.4	11.8	74.2	76.6
Memo: Increase in pay included above:											
Military	---	---	---	.1	1.1	1.6	2.4	3.4	---	3.4	3.6
Civilian	---	---	---	.2	.3	.6	:7	1.0	---	1.0	1.1
Increased Payments to Retired Personnel	---	---	.1	.2	.4	.6	.8	1.0	---	1.0	1.2
	---	---	.1	.5	1.8	2.8	4.0	5.4	---	5.4	5.9
	45.1	47.3	47.3	48.9	56.1	59.5	66.6	71.4	---	71.4	74.1

t for military and civilian pay increases authorized by P.L. 89-501 and P.L. 89-504; Medicare
.ssistance program authorized by P.L. 89-754.
appropriated to the military departments.

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TABLE 4

Department of Defense

DIRECT BUDGET PLAN (TOA), NEW OBLIGATIONAL AUTHORITY, AND EXPENDITURES

Fiscal Years 1966–1968

(Millions of Dollars)

	Direct Budget Plan (TOA)			New Obligational Authority			Expenditures		
	FY 1966	FY 1967	FY 1968	FY 1966	FY 1967	FY 1968	FY 1966	FY 1967	FY 1968
Functional classification									
Military Personnel									
Active Forces	14,652	17,636	[a]19,055	14,655	17,636	[a]19,055	14,407	17,465	[a]18,903
Reserve Forces	803	985	950	818	985	950	755	935	910
Retired Pay	1,592	1,814	2,020	1,600	1,814	2,020	1,591	1,800	2,010
Total	17,047	20,435	[a]22,025	17,073	20,435	[a]22,025	16,753	20,200	[a]21,823
Operation and Maintenance	15,378	19,274	[a]19,154	15,339	19,274	[a]19,154	14,710	18,600	[a]19,017
Subtotal—Operating	32,426	39,709	41,179	32,412	39,709	41,179	31,463	38,800	40,840
Procurement	22,595	24,386	24,013	20,013	22,886	22,917	14,339	18,465	21,632
Res., Devel., Test, & Evaluation	6,946	7,177	7,523	6,746	7,181	7,273	6,259	6,700	7,200
Military Construction	2,545	1,158	2,144	2,566	1,097	2,123	1,334	1,600	1,600
Family Housing	682	520	823	666	518	814	647	570	582
Civil Defense	105	102	111	107	101	111	86	97	100
Special Foreign Currency Program	-----	7	16	-----	7	16	-----	2	9
Revolving and Management Funds	-----	-----	-----	-----	535	241	281	716	337
Total—Military Functions	65,299	73,609	75,808	62,510	72,034	74,674	54,409	66,950	72,300
Military Assistance	1,163	888	621	1,023	782	596	968	1,000	800
Total—Mil. Functions & Mil. Ass't	66,462	73,956	76,429	63,533	72,816	[a]75,270	55,377	67,950	73,100
Department or Agency									
Department of the Army	18,548	22,920	23,918	17,492	22,989	23,629	14,832	21,108	23,372
Department of the Navy	19,462	21,365	21,690	18,486	20,709	21,134	16,026	18,978	20,429
Department of the Air Force	23,593	24,803	25,281	22,655	24,263	24,891	20,131	22,594	24,077
Defense Agencies/OSD	3,590	3,879	4,767	3,770	3,972	4,867	3,335	4,174	4,282
Civil Defense	105	102	111	107	101	111	86	97	100
Total—Military Functions	65,299	73,069	[a]75,808	62,510	72,034	[a]74,674	54,409	66,950	[a]72,300
Military Assistance	1,163	888	621	1,023	782	596	968	1,000	800
Total—Mil. Functions & Mil. Ass't	66,462	73,956	76,429	63,533	72,816	75,270	55,377	67,950	73,100

[a] FY 1968 includes amounts proposed for separate transmittal under proposed legislation not distributed by Military department, as follows:

	TOA	*NOA*	*Expds.*
Military personnel	$24 Million	$24 Million	$23 Million
Operation & Maintenance	18 Million	18 Million	17 Million
	$42 Million	$42 Million	$40 Million

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NOTE: FY 1967 NOA includes amounts proposed for separate transmittal: $12,275,870,000 for Southeast Asia Support; $340,130,000 for Military pay increase; $179,000,000 for civilian pay increase; $71,000,000 for Medicare benefits; and $11,000,000 for Homeowners Assistance

TABLE 5

Department of Defense

DIRECT BUDGET PLAN (TOA), NEW OBLIGATIONAL AUTHORITY, AND EXPENDITURES

Fiscal Year 1966–1968 By Functional Title and Service

(Millions of Dollars)

Functional Classification	Department of Defense—Total				Department of the Army				Department of the Navy				Department of the Air Force				Defense Agencies/ OSD/Civil Def.			
	FY 1966	FY 1967 Supplemental	FY 1967 total	FY 1968	FY 1966	FY 1967 Supplemental	FY 1967 total	FY 1968	FY 1966	FY 1967 Supplemental	FY 1967 total	FY 1968	FY 1966	FY 1967 Supplemental	FY 1967 total	FY 1968	FY 1966	FY 1967 Supplemental	FY 1967 total	FY 1968
Total obligational authority (TOA)																				
Military Personnel																				
Active Forces	14,652	1,620	17,636	a 19,055	5,149	729	6,898	7,870	4,565	381	5,212	5,467	4,939	510	5,526	5,694	----	---	----	----
Reserve Forces	803	50	985	950	521	45	680	642	145	2	151	154	137	3	155	153	----	---	----	----
Retired Pay	1,592	34	1,814	2,020	----	----	----	----	----	----	----	----	----	----	----	----	1,592	34	1,814	2,020
Total	17,047	1,704	20,435	a 22,025	5,670	774	7,577	8,512	4,710	383	5,363	5,621	5,075	513	5,681	5,847	1,592	34	1,814	2,020
Operation and Maintenance	15,378	3,562	19,274	a 19,154	5,098	2,061	7,448	7,344	4,268	790	5,071	5,101	5,259	595	5,790	5,679	753	115	965	1,012
Subtotal—Operating	32,426	5,266	39,709	41,179	10,768	2,835	15,025	15,857	8,979	1,173	10,434	10,722	10,334	1,109	11,471	11,526	2,345	149	2,779	3,032
Procurement																				
Aircraft	10,007	3,539	10,350	9,111	1,287	533	1,202	769	3,202	1,703	3,463	2,560	5,518	1,303	5,685	5,782	----	---	----	----
Missiles	2,020	102	2,199	2,786	364	6	560	769	408	51	354	649	1,248	45	1,284	1,368	----	---	----	----
Ships	1,876	----	2,041	1,946	----	----	----	----	1,876	----	2,041	1,946	----	----	----	----	----	---	----	----
Tracked Combat Vehicles	445	66	527	430	421	62	509	425	23	4	18	5	----	----	----	----	----	---	----	----
Ordnance, Vehicles, & Rel. Equip.	5,012	1,547	5,521	6,436	2,041	759	2,095	2,836	1,544	328	1,563	1,871	1,426	460	1,863	1,728	1	---	1	1
Electronics & Communications	1,473	403	1,502	1,444	507	303	617	550	473	57	519	560	487	44	361	323	6	---	5	11
Other Procurement	1,762	648	2,244	1,860	570	467	880	533	716	149	780	780	446	33	545	511	30	---	39	37
Total	22,595	6,306	24,386	24,013	5,190	2,130	5,863	5,881	8,242	2,292	8,738	8,371	9,125	1,884	9,738	9,712	37	---	45	48
Res., Devel., Test, & Evaluation																				
Military Sciences	601	----	616	615	160	----	161	165	181	----	189	192	157	----	160	157	103	---	107	101
Aircraft	1,256	26	1,171	1,145	101	4	114	116	292	12	335	280	845	10	711	740	17	---	12	10
Missiles	1,997	15	2,414	2,499	699	----	722	706	417	15	715	785	759	----	862	890	123	---	114	118
Astronautics	1,075	----	954	1,119	23	----	14	11	23	----	18	16	1,025	----	918	1,089	4	---	4	3
Ships	325	3	285	299	1	----	1	1	324	3	285	298	----	----	----	----	----	---	----	----
Ordnance, Vehicles, & Rel. Equip.	386	----	354	313	202	----	196	184	184	----	158	130	----	----	----	----	----	---	----	----
Other Equipment	901	91	968	988	262	36	307	309	83	10	110	137	314	23	308	307	243	22	243	234
Programwide Management & Support	405	----	395	421	75	----	78	79	79	----	98	102	241	----	208	228	11	---	11	12
Emergency Fund	----	----	18	125	----	----	----	----	----	----	----	----	----	----	----	----	----	---	18	125
Total	6,946	135	7,177	7,523	1,523	40	1,593	1,571	1,582	40	1,908	1,940	3,339	33	3,168	3,410	501	22	508	602
Military Construction																				
Active Forces	2,519	624	1,131	2,107	1,066	288	430	592	650	140	279	651	779	196	413	618	24	---	9	246
Reserve Forces	26	----	26	37	----	----	8	17	10	----	5	5	17	----	13	15	----	---	----	----
Total	2,545	624	1,158	2,144	1,066	288	438	609	659	140	285	656	796	196	426	633	24	---	9	246
Family Housing	682	11	530	823	----	----	----	----	----	----	----	----	----	----	----	----	682	11	530	823
Civil Defense	105	----	102	111	----	----	----	----	----	----	----	----	----	----	----	----	105	---	102	111
Special Foreign Currency Program	----	----	7	16	----	----	----	----	----	----	----	----	----	----	----	----	----	---	7	16
Total—Military Functions	65,299	12,342	73,069	75,808	18,548	5,293	22,920	23,918	19,462	3,645	21,365	21,690	23,593	3,222	24,803	25,281	3,695	182	3,981	4,878
Military Assistance	1,163	----	888	621	----	----	----	----	----	----	----	----	----	----	----	----	----	---	----	----
Total—TOA	66,462	12,342	73,956	76,429	18,548	5,293	22,920	23,918	19,462	3,645	21,365	21,690	23,593	3,222	24,803	25,281	3,695	182	3,981	4,878
Less financing adjustments	−2,929	----	−1,676	−1,400	−1,056	----	−282	−349	−976	----	−733	−559	−939	----	−540	−434	182	---	−15	−32
Plus NOA for Revolving Funds	----	535	535	241	----	351	351	60	----	77	77	4	----	----	----	44	----	107	107	133
New Obligational Authority	63,533	12,877	72,816	75,270	17,492	5,644	22,989	23,629	18,486	3,722	20,709	21,134	22,655	3,222	24,263	24,891	3,877	289	4,073	4,978
Expenditures	55,377	9,650	67,950	73,100	14,832	4,589	21,108	23,372	16,026	1,923	18,978	20,429	20,131	2,785	22,594	24,077	3,421	503	4,271	4,382

NOTE: FY 1967 TOA includes amounts proposed for separate transmittal: $11,749,570,000 for Southeast Asia Support; $340,130,000 for Military pay increase; $179,000,000 for civilian pay increase; $71,000,000 for Medicare benefits; and $11,000,000 for Homeowners Assistance.

a FY 1968 TOA includes amounts proposed for separate transmittal under proposed legislation not distributed by Military department, as follows:

Military Personnel $24 Million

Operation & Maintenance $18 Million

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TABLE 6

Department of Defense

ESTIMATED OBLIGATIONS AND AMOUNTS AVAILABLE FOR OBLIGATION

General Fund Appropriations—FY 1966–1968

(Millions of Dollars)

Item	New obligational authority	Reimbursement	Total available for obligation	Obligations	Unobligated balance carried forward	Unobligated balance as % of available
Fiscal Year 1966—Actual						
Department of the Army	17,492	3,211	23,174	21,000	2,156	9.3
Department of the Navy	18,486	1,750	25,381	18,714	6,666	26.2
Department of the Air Force	22,655	1,520	27,432	23,009	4,421	16.1
Defense Agencies/OSD	3,770	67	4,114	3,513	573	13.9
Civil Defense	107	----	130	90	39	30.0
Total—Military Functions	62,510	6,548	80,230	66,325	13,854	17.2
Military Assistance	1,023	6	906	895	11	1.2
Total—Mil. Functions & Mil. Assist.	63,533	6,555	81,136	67,220	13,865	17.0
Fiscal Year 1967—Estimated						
Department of the Army	22,638	3,339	28,240	25,901	2,339	8.2
Department of the Navy	20,632	1,584	28,903	23,615	5,288	18.2
Department of the Air Force	24,263	1,527	30,282	25,788	4,494	14.8
Defense Agencies/OSD	3,865	77	4,315	3,994	320	7.4
Civil Defense	101	----	142	130	12	8.4
Total—Military Functions	71,499	6,527	91,881	79,427	12,454	13.5
Military Assistance	728	10	743	733	10	1.3
Total—Mil. Functions & Mil. Assist.	72,227	6,537	92,624	80,160	12,464	13.4
Fiscal Year 1968—Estimated						
Department of the Army	23,569	3,246	29,154	26,944	2,210	7.5
Department of the Navy	21,130	1,576	27,995	22,516	5,479	19.5
Department of the Air Force	24,847	1,000	30,341	26,080	4,262	14.0
Defense Agencies/OSD	4,734	77	5,132	4,561	571	11.1
Civil Defense	111	----	123	118	5	4.0
Proposed legislation	42	----	42	42	-----	---
Total—Military Functions	74,433	5,900	92,787	80,261	12,526	13.4
Military Assistance	536	10	556	546	10	1.7
Total—Mil. Functions & Mil. Assist.	74,969	5,910	93,343	80,807	12,536	13.4

Notes: (1) The total available for obligation is the sum of (a) unobligated balances from the prior year (b) new obligational authority, (c) reimbursements and (d) transfers between appropriations.

(2) In addition to obligations, the unobligated balance carried forward was reduced by $51 million of expired obligating authority withdrawn.

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TABLE 7

Department of Defense

ESTIMATED EXPENDITURES AND AMOUNTS AVAILABLE FOR EXPENDITURES

Fiscal Years 1966–1968

(Millions of Dollars)

Item	New obliga-tional authority	Total available for expendi-ture	Expendi-tures	Unexpended balance carried forward	Unexpended balance as % of available
Fiscal Year 1966—Actual					
Department of the Army	17,492	23,781	14,832	8,941	37.5
Department of the Navy	18,486	34,128	16,026	18,074	52.9
Department of the Air Force	22,655	32,419	20,131	12,316	37.9
Defense Agencies/OSD	3,770	5,134	3,335	1,760	34.2
Civil Defense	107	211	86	119	56.3
Total—Military Functions	62,510	95,673	54,409	41,210	43.0
Military Assistance	1,023	2,799	968	1,831	65.4
Total—Mil. Functions & Mil. Assist.	63,533	98,472	55,377	43,041	43.7
Fiscal Years 1967—Estimated					
Department of the Army	22,989	32,037	21,108	10,930	34.1
Department of the Navy	20,709	38,884	18,978	19,907	51.1
Department of the Air Force	24,263	36,571	22,594	13,977	38.2
Defense Agencies/OSD	3,972	5,532	4,174	1,358	24.5
Civil Defense	101	220	97	123	55.9
Total—Military Functions	72,034	113,244	66,950	46,294	40.8
Military Assistance	782	2,613	1,000	1,613	61.7
Total—Mil. Functions & Mil. Assist.	72,816	115,856	67,950	47,906	41.3
Fiscal Year 1968—Estimated					
Department of the Army	23,629	34,558	23,372	11,186	32.3
Department of the Navy	21,134	41,047	20,429	20,618	50.2
Department of the Air Force	24,891	38,862	24,077	14,785	38.0
Defense Agencies/OSD	4,867	6,225	4,282	1,943	31.2
Civil Defense	111	234	100	134	57.2
Proposed legislation	42	42	40	2	4.7
Total—Military Functions	74,674	120,968	72,300	48,668	40.2
Military Assistance	596	2,209	800	1,409	63.7
Total—Mil. Functions & Mil. Assist.	75,270	123,176	73,100	50,076	40.6

Notes: (1) The total available for expenditure is the sum of (a) unexpended balances from the prior year, (b) new obligational authority and (c) transfers between appropriations. Transfers, which total $173 million in FY 1966; $200 million in FY 1967; and $6 million in FY 1968 are not shown in detail.

(2) In addition to expenditures, the unexpended balance carried forward was reduced in FY 1966 by $54 million of balances withdrawn.

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TABLE 8

Department of Defense

ORDER OF MAGNITUDE DATA ON COMPARATIVE NEW OBLIGATIONAL AUTHORITY BY FUNCTIONAL TITLE

FY 1954–1968

(Millions of Dollars)

	FY 1954	FY 1955	FY 1956	FY 1957	FY 1958	FY 1959	FY 1960	FY 1961	FY 1962	FY 1963	FY 1964	FY 1965	FY 1966	FY 1967	FY 1968
Functional classification															
Military Personnel															
Active Forces	11,266	10,650	10,526	10,411	10,398	10,709	10,637	10,695	11,545	11,431	12,273	12,699	14,655	17,636	[c] 19,055
Reserve Forces	315	369	512	613	607	644	674	660	633	672	703	751	818	985	950
Retired Pay	387	424	495	515	567	640	715	790	920	1,026	1,228	1,399	1,600	1,814	2,020
Total	11,968	11,442	11,534	11,539	11,572	11,983	12,026	12,144	13,098	13,129	14,204	14,849	17,073	20,435	[c] 22,025
Operation and Maintenance	9,462	8,276	8,768	9,734	10,221	10,187	10,317	10,702	11,759	11,496	11,705	12,603	15,339	19,274	[c] 19,154
Subtotal—Operating	21,430	19,718	20,302	21,273	21,793	22,180	22,343	22,846	24,857	24,625	25,909	27,452	32,412	39,709	41,179
Procurement															
Aircraft	5,041	4,922	6,923	6,559	5,945	6,167	5,929	4,998	5,646	5,882	5,640	5,962	9,354	9,529	8,721
Missiles	569	234	764	2,135	2,090	3,966	2,030	2,078	3,230	3,969	3,676	2,615	1,642	2,187	2,711
Ships	759	1,150	1,274	1,335	1,723	1,943	1,140	2,246	2,967	2,939	2,060	1,905	1,522	1,757	1,824
Tracked Combat Vehicles	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	211	435	429	430
Ordnance, Vehicles, and Related Equipment	2,990	527	405	247	90	545	703	1,034	1,830	1,959	2,028	1,431	4,252	5,154	5,809
Electronics and Communications	395	327	215	469	549	982	1,179	935	1,375	1,176	1,353	1,039	1,240	1,417	1,368
Other Procurement	835	260	214	549	586	701	702	425	697	742	889	672	1,568	2,413	2,055
Total	10,588	7,420	9,795	11,294	10,983	14,304	11,701	11,716	15,746	16,667	15,645	13,836	20,013	22,886	22,917
Research, Development, Test, and Evaluation	2,165	1,708	1,828	2,185	2,345	3,777	5,620	6,033	6,402	6,993	6,984	6,483	6,746	7,181	7,273
Military Construction	308	882	2,012	1,915	2,085	1,385	1,364	1,061	972	1,204	949	1,049	2,566	1,097	2,123
Family Housing	-----	-----	-----	-----	-----	-----	-----	-----	-----	590	644	631	666	518	814
Civil Defense	-----	-----	-----	-----	-----	-----	-----	-----	257	126	112	105	107	101	111
Special Foreign Currency Program	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	7	16
Revolving and Management Funds	100	1,119	-----	75	130	57	30	30	(b)	(b)	-----	-	(b)	535	241
Subtotal—Military Functions—New Obligational Avail.	34,590	30,847	33,937	36,742	37,337	41,703	41,058	41,686	48,234	50,204	50,243	49,557	62,510	72,034	74,674
Transfers from prior year balances	-----	−60	−750	−487	−590	−535	−430	−366	−388	−410	−321	−193	-----	-----	-----
Total—Military Functions—New Obligational Authority	34,590	30,787	33,187	36,255	36,747	41,168	40,628	41,321	47,846	49,794	49,922	49,363	62,510	72,034	74,674
Military Assistance	3,192	1,204	1,016	2,018	1,340	1,515	1,331	1,785	1,577	1,325	1,000	1,130	1,023	782	596
Total—Military Functions & & Military Assistance	37,783	31,991	34,203	38,273	38,087	42,683	41.595	43,106	49,423	51,119	50,922	50,493	63,533	72,816	75,270
Department or Agency															
Department of the Army	12,777	7,764	7,354	7,672	7,731	9,381	9,689	9,914	12,141	11,631	12,513	12,003	17,492	22,989	23,629
Department of the Navy	9,612	10,221	9,648	10,220	10,506	11,820	11,270	12,431	14,757	15,286	14,899	14,845	18,486	20,709	21,134
Department of the Air Force	11,411	12,137	15,517	17,697	17,732	18,713	18,496	17,884	19,513	20,179	19,446	19,219	22,655	24,263	24,891
Defense Agencies/OSD	791	666	667	666	777	1,255	1,173	1,092	1,178	2,572	2,951	3,192	3,770	3,972	4,867
Civil Defense	--	-----	-----	-----	-----	-----	--	-----	257	126	112	105	107	101	111
Total—Military Functions	34,590	30,787	33,187	36,255	36,747	41,168	40,628	41,321	47,846	49,794	49,922	49,363	62,510	72,034	[c] 74,674
Military Assistance	3,192	1,204	1,016	2,018	1,340	1,515	1,331	1,785	1,577	1,325	1,000	1,130	1,023	782	596
Total—Military Functions and Military Assistance	37,783	31,991	34,203	38,273	38,087	42,683	41,959	43,106	49,423	51,119	50,922	50,493	63,533	72,816	75,270

NOTE: Amounts include estimated comparability adjustments not supportable by accounting records.

[a] Amount included in entry for "Ordnance, Vehicles, and Related Equipment."

[b] Excludes authority in Stock Funds (10 U.S.C. 2210(b)) to incur reimbursable obligations in anticipation of reimbursable orders to be received in subsequent years. Such authority is included in the Budget Document presentation as "New Obligational Authority."

[c] FY 1968 includes amounts proposed for separate transmittal under proposed legislation not disturbed by military department, as follows:

Military Personnel	$24 Million
Operation & Maintenance	18 Million
Total	$42 Million

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Department of Defense

ORDER OF MAGNITUDE DATA ON COMPARATIVE EXPENDITURES BY FUNCTIONAL TITLE

FY 1954–1968

(Millions of Dollars)

	FY 1954	FY 1955	FY 1956	FY 1957	FY 1958	FY 1959	FY 1960	FY 1961	FY 1962	FY 1963	FY 1964	FY 1965	FY 1966	FY 1967	FY 1968
Functional classification															
Military Personnel															
Active Forces	10,963	10,643	10,665	10,384	10,441	10,545	10,390	10,651	11,530	11,386	12,312	12,662	14,407	17,465	[b] 18,903
Reserve Forces	293	341	439	514	608	615	654	648	607	599	674	725	755	935	910
Retired Pay	386	419	477	511	562	641	694	786	894	1,015	1,209	1,384	1,591	1,800	2,010
Total	11,643	11,403	11,582	11,409	11,611	11,801	11,738	12,085	13,032	13,000	14,195	14,771	16,753	20,200	[b] 21,823
Operation and Maintenance	9,162	7,931	8,400	9,487	9,761	10.378	10.223	10,611	11,594	11,874	11,932	12,349	14,710	18,600	[b] 19,017
Subtotal—Operating	20,805	19,334	19,982	20,896	21,372	22,179	21,961	22,696	24,626	24,874	26,127	27,120	31,463	38,800	40,840
Procurement															
Aircraft	9,080	8,804	7,835	8,647	8,793	7,730	6,272	5,898	6,400	6,309	6,053	5,200	6,635	8,010	9,003
Missiles	417	604	1,005	1,855	2,434	3,337	3,027	2,972	3,442	3,817	3,577	2,096	2,069	1,990	2,213
Ships	905	944	858	842	1,105	1,491	1,744	1,801	1,906	2,522	2,078	1,713	1,479	1,450	1,575
Tracked Combat Vehicles	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	236	202	265	350
Ordnance, Vehicles and Related Equipment	3,334	1,191	1,260	674	365	399	443	675	1,137	1,665	1,597	1,073	1,697	3,935	5,204
Electronics and Communications	700	441	660	704	663	720	1,093	1,042	1,139	1,427	1,264	897	983	1,129	1,159
Other Procurement	1,521	854	608	767	723	730	755	706	507	891	782	625	1,273	1,686	2,129
Total	15,597	12,838	12,227	13,488	14,083	14,409	13,334	13,095	14,532	16,632	15,351	11,839	14,339	18,465	21,632
Research, Development, Test, and Evaluation	2,187	2,261	2,101	2,406	2,504	2,866	4,710	6,131	6,319	6,376	7,021	6,236	6,259	6,700	7,200
Military Construction	1,744	1,715	2,079	1,968	1,753	1,948	1,626	1,605	1,347	1,144	1,026	1,007	1,334	1,600	1,600
Family Housing	-----	-----	-----	-----	-----	-----	-----	-----	-----	427	580	619	647	570	582
Civil Defense	−3	*	*	−1	*	*	*	*	90	203	107	93	86	97	100
Special Foreign Currency Program	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2	9
Revolving and Management Funds	−219	−611	−684	−323	−643	−179	−416	−300	−99	−1,401	−452	−741	281	716	337
Adjustment to Budget Basis	−145	−6	86	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Total—Military Functions	40,326	35,531	35,792	38,436	39,070	41,223	41,215	43,227	46,815	48,252	49,760	46,173	54,409	66,950	72,300
Military Assistance	3,629	2,292	2,611	2,352	2,187	2,340	1,609	1,449	1,390	1,721	1,485	1,229	968	1,000	800
Total—Military Functions & Military Assistance	43,955	37,823	38,403	40,788	41,258	43,563	42,824	44,676	48,205	49,973	51,245	47,401	55,377	67,950	73,100
Department or Agency															
Department of the Army	12,910	8,901	8,703	9,063	9,051	9,467	9,392	10,130	11,427	11,499	12,050	11,600	14,832	21,108	23,372
Department of the Navy	11,290	9,732	9,744	10,397	10,913	11,720	11,642	12,214	13,260	14,005	14,520	13,399	16,026	18,978	20,429
Department of the Air Force	15,666	16,405	16,750	18,361	18,437	19,083	19,065	19,785	20,840	20,642	20,509	18,216	20,131	22,594	24,077
Defense Agencies/OSD	464	494	596	615	669	953	1,115	1,098	1,198	1,905	2,574	2,865	3,335	4,174	4,282
Civil Defense	−3	*	*	−1	*	*	*	*	90	203	107	93	86	97	100
Total—Military Functions	40,326	35,531	35,792	38,436	39,070	41,223	41,215	43,227	46,815	48,252	49,760	46,173	54,409	66,950	[b] 72,300
Military Assistance	3,629	2,292	2,611	2,352	2,187	2,340	1,609	1,449	1,390	1,721	1,485	1,229	968	1,000	800
Total—Military Functions & Military Assistance	43,955	37,823	38,403	40,788	41,258	43,563	42,824	44,676	48,205	49,973	51,245	47,401	55,377	67,950	73,100

NOTE: Amounts include estimated comparability adjustments not supportable by accounting records.

* Less than \$.5 million.

[a] Amount included in entry for "Ordnance, Vehicles, and Related Equipment."

[b] FY 1968 includes amounts proposed for separate transmittal under proposed legislation not distributed by military department, as follows:

Military Personnel	\$23 Million
Operation & Maintenance	17 Million
Total	\$40 Million

OASD (Comptroller)
January 24, 1967
FAD–397

TABLE 10

Department of Defense

FINANCIAL SUMMARY OF FY 1967 BUDGET

Appropriations Enacted and Supplementals Proposed

(Thousands of Dollars)

	Appropriations enacted	Transfers and adjustments	Military and civilian pay Supplemental	"Medicare" and "Homeowners Assistance" Supplemental	S.E.A. Supplemental	Total
Military Personnel						
Military Personnel, Army	6,164,400	4,164	78,500	-----	650,500	6,897,564
Military Personnel, Navy	3,652,100	−4,164	77,700	-----	220,800	3,946,436
Military Personnel, M.C.	1,183,200	--------	24,300	-----	58,400	1,265,900
Military Personnel, A.F.	5,015,800	--------	106,300	-----	403,700	5,525,800
Reserve Personnel, Army	288,211	--------	6,200	-----	14,900	309,311
Reserve Personnel, Navy	112,600	--------	800	-----	---------	113,400
Reserve Personnel, M.C.	36,500	--------	800	-----	---------	37,300
Reserve Personnel, A.F.	69,700	--------	1,100	-----	---------	70,800
Nat'l Guard Personnel, Army	346,533	--------	8,520	-----	15,280	370,333
Nat'l Guard Personnel, A.F.	82,000	--------	1,910	-----	290	84,200
Retired Pay, Defense	1,780,000	--------	34,000	-----	---------	1,814,000
TOTAL—Military Personnel	18,731,044	--------	340,130	-----	1,363,870	20,435,044
Operation and Maintenance						
Oper. & Maint., Army	5,122,427	33,005	64,000	29,000	1,968,000	7,216,432
Oper. & Maint., Navy	3,980,300	−24,806	42,000	25,000	624,000	4,646,494
Oper. & Maint., M.C.	325,600	−48	2,300	-----	96,700	424,552
Oper. & Maint., A.F.	4,943,100	−1,823	49,000	17,000	528,000	5,535,277
Oper. & Maint., Def. Agcs.	806,500	2,517	20,300	-----	85,800	915,117
O&M, Army Nat'l Guard	231,000	--------	------	-----	---------	231,000
O&M, Air Nat'l Guard	253,300	--------	1,400	-----	---------	254,700
Nat'l Bd for Prom. R.P.,A	494	--------	------	-----	---------	494
Claims, Defense	25,000	--------	------	-----	9,000	34,000
Contingencies, Defense	15,000	--------	------	-----	---------	15,000
Ct of Mil Appeals, Defense	600	--------	------	-----	---------	600
TOTAL—Oper. & Maint.	15,703,321	8,844	179,000	71,000	3,311,500	19,273,665
Procurement						
Proc. of Equip. & Msls, Army	3,483,300	--------	------	-----	2,130,000	5,613,300
Proc. of A/C & Msls, Navy	1,789,900	−58,000	------	-----	1,752,000	3,483,900
Shipbldg. & Conv., Navy	1,756,700	--------	------	-----	---------	1,756,700
Other Procurement, Navy	1,968,300	--------	------	-----	287,000	2,255,300
Procurement, M.C.	262,900	--------	------	-----	253,000	515,900
A/C Proc., Air Force	4,017,300	−4,000	------	-----	1,303,000	5,316,300
Missile Proc., Air Force	1,189,500	--------	------	-----	45,000	1,234,500
Other Proc., Air Force	2,122,600	--------	------	-----	536,000	2,658,600
Proc., Defense Agencies	51,300	--------	------	-----	---------	51,300
TOTAL—Procurement	16,641,800	−62,000	------	-----	6,306,000	22,885,800
Res., Dev., Test, & Eval.						
RDT&E, Army	1,528,700	27,998	------	-----	40,000	1,596,698
RDT&E, Navy	1,758,600	115,436	------	-----	40,000	1,914,036
RDT&E, Air Force	3,112,600	23,151	------	-----	33,000	3,168,751
RDT&E, Defense Agencies	459,059	1,781	------	-----	22,000	482,840
Emergency Fund, Defense	125,000	−106,805	------	-----	---------	18,195
TOTAL—RDT&E	6,983,959	61,561	------	-----	135,000	7,180,520
Military Construction						
Military Constr., Army	114,014	--------	------	-----	288,500	402,514
Military Constr., Navy	126,918	--------	------	-----	140,000	266,918
Military Constr., A.F.	205,495	--------	------	-----	196,000	401,495
Military Constr., Def. Agcs.	7,547	440	------	-----	---------	7,986
Military Constr., Army Res.	--------	--------	------	-----	---------	---------
Military Constr., Naval Res.	5,400	--------	------	-----	---------	5,400
Military Constr., A.F. Res.	3,600	--------	------	-----	---------	3,600
Military Constr., Army N.G.	--------	--------	------	-----	---------	---------
Military Constr., Air N.G.	9,400	--------	------	-----	---------	9,400
Loran Stations, Defense	--------	--------	------	-----	---------	---------
TOTAL—Military Constr.	472,374	440	------	-----	624,500	1,097,314

(Continued on page 50)

TABLE 10—Continued

Department of Defense

FINANCIAL SUMMARY OF FY 1967 BUDGET

Appropriations Enacted and Supplementals Proposed
(Thousands of Dollars)

	Appropriations enacted	Transfers and adjustments	Military and civilian pay Supplemental	"Medicare" and "Homeowners Assistance" Supplemental	S.E.A. Supplemental	Total
Family Housing						
Family Housing, Defense	507,196	--------	------	-----	---------	507,196
Homeowners Assistance, Def.	--------	--------	------	11,000	---------	11,000
Civil Defense						
O&M, Civil Defense	66,100	−1	------	-----	---------	66,099
Research, Shelter Survey & Marking, Civil Defense	35,000	--------	------	-----	---------	35,000
Constr. of Facilities, C. D.	--------	--------	------	-----	---------	---------
TOTAL—Civil Defense	101,100	−1	------	-----	---------	101,099
Special Foreign Currency Prog.	7,348	--------	------	-----	---------	7,348
Revolving Funds						
Army Stock Fund	--------	--------	------	-----	351,000	351,000
Navy Stock Fund	--------	--------	------	-----	77,000	77,000
Defense Stock Fund	--------	--------	------	-----	107,000	107,000
TOTAL—Revolving Funds	--------	--------	------	-----	535,000	535,000
MILITARY FUNCTIONS—TOTALS						
Department of the Army	17,279,079	65,167	157,220	29,000	5,458,180	22,988,646
Department of the Navy	16,959,018	28,418	147,900	25,000	3,548,900	20,709,236
Department of the Air Force	21,024,395	17,328	159,710	17,000	3,044,990	24,263,423
Defense Agencies/OSD	3,784,550	−102,069	54,300	11,000	223,800	3,971,581
Civil Defense	101,100	−1	------	-----	---------	101,099
TOTAL—Military Functions	59,148,142	8,842	519,130	82,000	12,275,870	72,033,984
Military Assistance	792,000	−10,425	------	-----	---------	781,575
TOTAL NOA—DOD	59,940,142	−1,583	519,130	82,000	12,275,870	72,815,559
Total Expenditures—DOD	58,300,000	--------	505,000	61,000	9,084,000	67,950,000

OASD (Comptroller)
January 24, 1967

TABLE 11

Department of Defense

NET ADDITIONS TO THE FY 1967 PROCUREMENT PROGRAM FOR SOUTHEAST ASIA

(Millions of Dollars)

	Army	Navy and Marine Corps	Air Force	Total
Ammunition	309	89	279	677
Aircraft				
Combat Attrition	14	1,073	438	1,525
Training and Other	258	135	46	439
Spares	149	314	533	996
Other A/C Equipment	169	329	257	755
Total Aircraft	590	1,851	1,274	3,715
Vehicles	288	167	51	506
Electronics and Communications	338	102	141	581
Other	607	131	110	*840
Total Changes in Program (TOA)	2,130	2,340	1,855	*6,317
Financing Adjustments	---	−48	+29	*−11
FY 1967 Supplemental (NOA)	2,130	2,292	1,884	6,306

* Reflects $8 million reduction in Procurement, Defense Agencies program.

OASD (Comptroller)
January 24, 1967

TABLE 12

Department of Defense

MAJOR PROCUREMENT ITEM QUANTITIES

FY 1967 and 1968 Programs

	FY 1967 program			FY 1968 program
	Enacted funds	Supplemental	Total	
Aircraft				
Army	1,807	890	2,697	1,479
Navy & Marine Corps	560	487	1,047	680
Air Force	821	207	1,028	1,250
Total—All Services				
Helicopters	1,903	863	2,766	1,588
Other aircraft	1,285	721	2,006	1,821
Total—All Services	3,188	1,584	4,772	3,409
Missiles				
Army	34,715	---	34,715	26,237
Navy & Marine Corps	6,172	1,992	8,164	12,815
Air Force	4,777	---	4,777	5,273
Total—Missiles	45,664	1,992	47,656	44,325
Ships—Navy				
New construction	57	---	57	34
Conversions	8	---	8	21
Total—Ships	65	---	65	55
Tracked combat vehicles				
Army	4,437	1,392	5,829	4,797
Marine Corps	144	7	151	--
Total—tracked combat vehicles	4,581	1,399	5,980	4,797

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TABLE 13

Department of Defense

MILITARY AND CIVILIAN PERSONNEL

Yearend Number

	FY 1965 actual	FY 1966 actual	FY 1967 estimate	FY 1968 estimate
Military Personnel				
Army				
Officers	111,541	117,205	142,837	154,900
Enlisted	854,755	1,079,525	1,308,453	1,362,004
Military Academy cadets	2,017	2,316	2,910	3,096
Total—Army	968,313	1,199,046	1,454,200	1,520,000
Navy				
Officers	77,720	79,467	83,773	85,014
Enlisted	588,353	660,130	665,298	673,031
Naval Academy midshipmen	4,179	4,331	4,243	4,243
Aviation cadets	757	551	80	
Total—Navy	671,009	744,469	753,394	762,288
Marine Corps				
Officers	17,234	20,485	24,193	25,211
Enlisted	172,638	240,909	255,831	269,316
Aviation cadets	315	293	600	387
Total—Marine Corps	190,187	261,687	280,624	294,914
Air Force				
Officers	131,141	130,285	135,986	137,828
Enlisted	689,585	752,913	759,250	745,697
Air Force Academy cadets	2,907	3,152	3,364	3,575
Total—Air Force	823,633	886,350	898,600	887,100

(Continued Page 52)

TABLE 13 (Continued)

Department of Defense

MILITARY AND CIVILIAN PERSONNEL

Yearend Number

	FY 1965 actual	FY 1966 actual	FY 1967 estimate	FY 1968 estimate
Department of Defense Total				
Officers	337,636	347,432	386,789	402,953
Enlisted	2,305,331	2,733,477	2,988,832	3,050,048
Academy cadets and midshipmen	9,103	9,799	10,517	10,914
Aviation cadets	1,072	844	680	387
Total—Defense	2,653,142	3,091,552	3,386,818	3,464,302
Civilian Personnel				
Army	332,875	371,121	426,164	431,474
Navy	333,271	356,744	398,608	410,787
Air Force	291,496	306,911	319,462	325,796
Defense Agencies/OSD	42,278	68,923	72,361	72,057
Total—Defense	999,920	1,103,699	1,216,595	1,240,114

OASD (Comptroller)
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Contract Funds Status Report Approved by Bureau of the Budget

During December 1966 the Bureau of the Budget (BOB) approved the quarterly contractor reporting requirements described by DOD Instruction 7800.7, "Contract Funds Status Report" (CFSR). BOB's approval followed extensive coordination between industry representatives and Defense officials.

DOD and industry have a mutual interest in information about funding. The DOD manager must assure the adequacy of the funds for varied Defense programs and at the same time exercise administrative fund controls on appropriations required by public law. Industry, on the other hand, is vitally concerned about receiving timely payments in appropriate amounts. Funds reporting has evolved from the need to satisfy both needs.

The first effort for uniform application throughout DOD in this area occurred in 1959 with the development of the Financial Management Report, DD 1097. This report was designed to be used essentially to assess potential expenditure levels. As expenditure restraints eased, it was adapted to answer funding status questions. This report proved to be inadequate from both industry and DOD points of view. To overcome its deficiencies, individual report versions were designed by the Military Departments to provide their representatives with better information. These reports were limited to a small number of contractors and, thus, did not require BOB approval.

To curb the tendency toward proliferation of data gathering efforts on this subject, DOD in 1964 undertook to install a single uniform approach for DOD-wide use. The resulting Contract Funds Status Report was developed through continuous consultation with industry. These consultations started in 1964 as a part of the Cost and Economic Information System (CEIS). During March 1966, industry, through the Council of Defense Space and Industry Associations (CODSIA), was provided a draft version of the CFSR reporting instruction. CODSIA comments and recommendations were received in May 1966, and a series of joint DOD-industry meetings was held in late summer to discuss the CODSIA recommendations. Many changes were made to the original proposal as a result of industry comments. CFSR has benefited from this exposure. It can become a useful, workable document that will serve the needs of both DOD and industry.

In gaining BOB approval, the CFSR joins the Cost Information Reports (CIR) and the Economic Information System (EIS) as visible parts of the Selected Acquisitions Information and Management Systems (SAIMS).

The CFSR is designed to supply the funding data that, with other performance measurement inputs, will provide information about Defense contracts to DOD managers for:

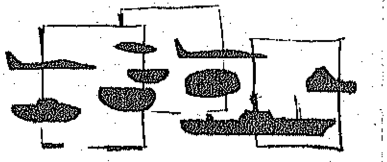
- Updating and forecasting contract fund requirements.
- Planning and decision making on funding changes in contracts.
- Developing fund requirements and budget estimates in support of approved programs.

The contractor compares current funding with estimated fund requirements and describes the relative firmness of requirements on which estimates are based. Reasons for changes in quantitative fund requirements are also to be submitted.

In view of the lead time required to adjust approved levels of funding when changes in estimated fund requirements are involved, reporting accurate information as early as possible is a matter of pronounced importance to the contracting parties (DOD and industry) who must use the information.

The CFSR will be implemented on all new contracts, which require funds status reporting, to replace reports such as the DD 1097, DD 1097 Addendum NAVWEPS 7810/4, and the Contractor Financial Requirements Estimate (CFRE). If suitable arrangements to incorporate this reporting requirement can be made, the current use of the aforementioned reports will be discontinued in existing contracts. The instructions (DOD Instruction 7800.7) include descriptions of data items which are the contractor's required input to the CFSR.

Questions concerning the implementation of CFSR should be referred to the Directorate for Assets Management Systems, Office of the Assistant Secretary of Defense (Comptroller), Room 3B 857, The Pentagon, Washington, D.C., 20301, Telephone (202) OXford 7-7565.



DEFENSE PROCUREMENT

Contracts of $1,000,000 and over awarded during the month of January 1967:

DEFENSE SUPPLY AGENCY

3—**Lester D. Lawson & Co.**, Long Beach, Calif. $1,153,350. 33,000 cases of ration supplement sundries packs. Defense Personnel Support Center, Philadelphia, Pa.

—**Van Brode Milling Co.**, Clinton, Mass. $1,144,867. 33,060 cases of ration supplement sundries packs. Defense Personnel Support Center, Philadelphia, Pa.

—**Rachelle Laboratories**, Long Beach, Calif. $1,108,153. 551,320 bottles of tetracyline hydrochloride. Defense Personnel Support Center, Philadelphia, Pa.

—**Landis Clothes**, Vineland, N.J. $1,041,747. 43,370 men's polyester and wool coats. Defense Personnel Support Center, Philadelphia, Pa.

—**Joseph H. Cohen & Sons**, Philadelphia, Pa. $1,269,355. 39,500 men's polyester and wool coats. Defense Personnel Support Center, Philadelphia, Pa.

—**Irwin Mills, Division of Burlington Industries**, New York City, N.Y. $1,027,742. 631,360 white cotton bed sheets. Defense Personnel Support Center, Philadelphia, Pa.

—**Endicott Johnson Corp.**, Endicott, N.Y. $1,067,032. 100,000 pairs of shoes. Defense Personnel Support Center, Philadelphia, Pa.

—**Pioneer Bag Co.**, North Kansas City, Mo. $1,255,500. 5,000,000 sandbags. Defense General Supply Center, Richmond, Va.

—**Continental Wire Corp.**, York, Pa. $1,632,010. 958,500 feet of shipboard cable. Defense Industrial Supply Center, Philadelphia, Pa.

—**Okonite Co.**, Passaic, N.J. $1,036,778. 516,200 feet of shipboard cable. Defense Industrial Supply Center, Philadelphia, Pa.

4—**The Defense Personnel Support Center**, Philadelphia, Pa., has awarded the following contracts for cotton duck cloth:

B. G. Colton & Co., New York City, N.Y. $1,733,697. 2,250,000 square yards.

American Finishing Co., Memphis, Tenn. $1,620,205. 2,004,219 square yards.

Graniteville Co., New York City, N.Y. $2,080,881. 2,206,521 square yards.

Putnam Mills, New York City, N.Y. $5,036,651. 6,456,000 square yards.

Saddler Textiles, Inc., New York City, N.Y. $1,289,418. 1,774,000 square yards.

—**Bern Kane Products, Inc.**, Brooklyn, N.Y. $1,041,000. 100,000 folding canvas cots. Defense General Supply Center, Richmond, Va.

5—**A. M. Ellis Hosiery Co.**, Philadelphia, Pa. $1,179,356. 1,451,320 pairs of men's cotton and nylon socks. Defense Personnel Support Center, Philadelphia, Pa.

—**Rachman Mfg. Co.**, Reading, Pa. $1,838,240. 492,000 helmet liner insulating caps. Defense Personnel Support Center, Philadelphia, Pa.

—**Cherubino Petti & Co.**, Atlantic City, N.J. $1,742,250. 75,000 men's polyester and wool tropical coats. Defense Personnel Support Center, Philadelphia, Pa.

—**Burlington Industries, Pacific Mills Div.**, New York City, N.Y. $3,480,000. 1,000,000 linear yds of wool serge cloth. Defense Personnel Support Center, Philadelphia, Pa.

—**Pembroke, Inc.**, Egg Harbor City, N.J. $4,115,700. 90,000 men's wool gabardine overcoats. Defense Personnel Support Center, Philadelphia, Pa.

—**Foster Co.**, Philadelphia, Pa. $2,862,510. 64,500 men's wool gabardine overcoats. Defense Personnel Support Center, Philadelphia, Pa.

—**Neptune Raincoat Co.**, New York City, N.Y. $4,327,000. 100,000 men's wool gabardine overcoats. Defense Personnel Support Center, Philadelphia, Pa.

—**Prestex, Inc.**, New York City, N.Y. $1,190,632. 3,144,000 linear yds. of polyester and cotton fabric. Defense Personnel Support Center, Philadelphia, Pa.

—**Deering Milliken, Inc.**, New York City, N.Y. $3,752,749. 1,086,600 linear yds. of wool gabardine cloths. Defense Personnel Support Center, Philadelphia, Pa.

—**Burlington Industries, Inc.**, New York City, N.Y. $1,006,895. 1,053,000 linear yds. of cotton twill cloth. Defense Personnel Support Center, Philadelphia, Pa.

—**J. P. Stevens & Co.**, New York City, N.Y. $4,138,041. 4,500,000 linear yds. of cotton twill cloth. Defense Personnel Support Center, Philadelphia, Pa.

—**C. M. London Co.**, New York City, N.Y. $1,816,100. 2,000,000 square yds. of cotton twill cloth. Defense Personnel Support Center, Philadelphia, Pa.

—**Chatham Mfg. Co.**, Elkin, N.C. $3,208,388. 436,776 wool blankets. Defense Personnel Support Center, Philadelphia, Pa.

—**Burlington Industries, Cleveland Woolens Div.**, Cleveland, Tenn. $3,567,039. 500,000 wool blankets. Defense Personnel Support Center, Philadelphia, Pa.

—**Bern Kane Products**, Brooklyn, N.Y. $1,041,000. 100,000 folding canvas cots. Defense General Supply Center, Richmond, Va.

9—**United Aircraft**, Hartford, Conn. $1,871,448. Aircraft bearings. Hartford. Defense Industrial Supply Center, Philadelphia, Pa.

10—**U.S. Rubber**, Providence, R.I. $3,767,700. 7,600 fuel drums (500-gallon). Defense General Supply Center, Richmond, Va.

—**Davis Sportswear Co.**, Lawrence, Mass. $2,369,000. 55,000 men's wool gabardine overcoats. Defense Personnel Support Center, Philadelphia, Pa.

—**Gentry Clothing Co.**, Philadelphia, Pa. $2,220,500. 50,000 men's wool gabardine overcoats. Defense Personnel Support Center, Philadelphia, Pa.

11—**Dow Chemical Co.**, Midland, Mich. $4,548,000. Chemicals. Defense General Supply Center, Richmond, Va.

—**H. Wenzel Tent & Duck Co.**, St. Louis, Mo. $2,700,746. 11,500 small-sized general purpose tents. Defense Personnel Support Center, Philadelphia, Pa.

16—**J. P. Stevens & Co.**, New York City, N.Y. $1,567,019. 901,600 yds. of wind-resistant cotton oxford cloth. Defense Personnel Support Center, Philadelphia, Pa.

—**Macshore Classics, Inc.**, New York City, N.Y. $2,625,000. 700,000 men's wind-resistant cotton poplin coats. Defense Personnel Support Center, Philadelphia, Pa.

—**Bonham Mfg. Co.**, Bonham, Tex. $1,690,800. 400,000 men's wind-resistant cotton poplin coats. Defense Personnel Support Center, Philadelphia, Pa.

17—**Addison Shoe Corp.**, Wynne, Ark. $1,222,874. 120,000 pairs of safety traction tread shoes. Defense Personnel Support Center, Philadelphia, Pa.

18—**Marathon Oil Co.**, New York City, N.Y. $2,046,209. 520,000 barrels of grade DF-1 diesel oil. Defense Fuel Supply Center, Alexandria, Va.

—**Hayward Schuster Woolen Mills**, East Douglas, Mass. $1,842,906. 167,920 woolen blankets. Defense Personnel Support Center, Philadelphia, Pa.

—**A. G. Dewey Co.**, Enfield, N.H. $1,100,605. 137,760 woolen blankets. Defense Personnel Support Center, Philadelphia, Pa.

19—**Coastal States Petrochemical Co.**, Houston, Tex. $1,594,950. 14,700,000 gallons of JP-4 jet fuel. Defense Fuel Supply Center, Alexandria, Va.

—**Atlantic Richfield Co.**, Philadelphia, Pa. $1,467,900. 12,600,000 gallons of JP-4 jet fuel. Defense Fuel Supply Center, Alexandria, Va.

23—**Bluebell, Inc.**, Greensboro, N.C. $1,002,750. 500,000 men's cotton khaki trousers. Defense Personnel Support Center, Philadelphia, Pa.

24—**J. P. Stevens, Inc.**, New York City, N.Y. $1,300,000. 650,000 yards of wool and polyester cloth. Defense Personnel Support Center, Philadelphia, Pa.

25—**Irving Air Chute Co.**, Lexington, Ky. $1,521,284. 6,840 small-size general purpose tents. Defense Personnel Support Center, Philadelphia, Pa.

—**M. Sloane Mfg. Co.**, Chelsea, Mass. $1,381,350. 5,000 medium-size general purpose tents. Defense Personnel Support Center, Philadelphia, Pa.

—**J. P. Stevens & Co.**, New York City, N.Y. $1,114,515. 610,000 linear yds. of cloth. Defense Personnel Support Center, Philadelphia, Pa.

26—**Nautex-Riviera Corp.**, New York City, N.Y. $2,451,696. 5,000,000 pairs of men's cotton shorts. Defense Personnel Support Center, Philadelphia, Pa.

—**Van Brode Milling Co.**, Clinton, Mass. $2,212,740. 64,380 cases of ration supplement sundries packs. Defense Personnel Support Center, Philadelphia, Pa.

—**Lester D. Lawson & Co.**, Long Beach, Calif. $2,261,889. 67,620 cases of ration supplement sundries packs. Defense Personnel Support Center, Philadelphia, Pa.

27—**Sun Oil Co.**, Philadelphia, Pa. $2,041,200. 18,900,000 gallons of JP-4 jet fuel. Defense Fuel Supply Center, Alexandria, Va.

—**Humble Oil & Refining Co.**, Houston, Tex. $1,637,160. 16,800,000 gallons of JP-4 jet fuel. Defense Fuel Supply Center, Alexandria, Va.

—**Coastal States Petrochemical Co.**, Houston, Tex. $1,342,656. 12,600,000 gallons of JP-4 fuel. Defense Fuel Supply Center, Alexandria, Va.

—**Hess Oil & Chemical Corp.**, Perth Amboy, N.J. $1,320,606. 12,600,000 gallons of JP-4 jet fuel. Defense Fuel Supply Center, Alexandria, Va.

31—**Dow Chemical Co.**, Midland, Mich. $1,217,626. 170,000 gallons of chemicals. Defense General Supply Center, Richmond, Va.

—**Armstrong Products Co.**, Huntington, W. Va. $1,626,995. 8,600 field range burner units, 4,300 field range cabinets and associated spare parts. Defense General Supply Center, Richmond, Va.

DEFENSE COMMUNICATIONS AGENCY

6—**System Sciences Corp.**, Falls Church, Va. $3,000,000. Continuation of engineering services in support of the Defense Communications Agency's satellite communications project in CY 1967.

ARMY

3—**Western Electric**, New York City, N.Y. $3,200,000. FY 1967 Nike Hercules and improved Nike Hercules engineering services. Burlington, N.C.; Syracuse, N.Y.; and Santa Monica, Calif. Army Missile Command, Huntsville, Ala.

—**Hallicrafters**, Chicago, Ill. $1,383,000. Engineering development service test models of a countermeasure set. Chicago. Army Electronics Command, Fort Monmouth, N.J.

—**Seattle Stevedore Co.**, Seattle, Wash. $12,867,332. Stevedoring services and related terminal services at the Navy Supply Depot, Seattle, Wash., for the period of Feb. 1, 1967 through Jan. 31, 1969. Western Area, Military Traffic Management and Terminal Service, Oakland, Calif.

4—**Piasecki Aircraft Corp.**, Mayfield, Pa. $1,252,101. Cable assemblies. Mayfield. Army Electronics Command, Philadelphia, Pa.

CONTRACT LEGEND

Contract information is listed in the following sequency: Date—Company—Value—Material or Work to be Performed—Location Work Performed—Contracting Agency.

—**Darragh & Lyda**, San Antonio, Tex. $1,027,201. Construction of a medical laboratory at Fort Sam Houston, Tex. Engineer Dist., Fort Worth, Tex.

5—**Browning Construction Co.**, San Antonio, Tex. $5,089,900. Construction of a recruit training and housing facility at Lackland AFB, Tex. Engineer Dist., Fort Worth, Tex.

6—**Colt's Inc.**, Hartford, Conn. $1,581,159. M16/XM16E1 rifle magazine assemblies. Hartford. Army Weapons Command, Rock Island Arsenal, Ill.

—**Guy H. James Construction Co.**, Oklahoma City, Okla. $10,538,665. Work on the Arkansas River and tributaries, Arkansas and Oklahoma Project. Wagoner County, Okla. Engineer Dist., Tulsa, Okla.

9—**Bauer Dredging Co.**, New York City, N.Y. $2,706,247. Dredging work on the Hampton Roads, Va., Channel Deepening Project. Engineer Dist., Norfolk, Va.

10—**Scovill Mfg. Co.**, Waterbury, Conn. $1,350,000. Grenade fuzes. Waterbury. Ammunition Procurement & Supply Agency, Joliet, Ill.

11—**Weymouth Construction Co.**, Memphis, Tenn. $2,487,800. Work on the Mississippi River and Tributaries—Flood Control Revetments Project. St. Francisville, La. Engineer Dist., New Orleans, La.

—**Defense Metal Products**, Sylacauga, Ala. $8,642,623. Metal parts for 155mm projectiles. Sylacauga. Ammunition Procurement & Supply Agency, Joliet, Ill.

12—**Emerson Electric Co.**, St. Louis, Mo. $7,711,285. Armament subsystems (XM-28) for Cobra helicopters. St. Louis. Army Weapons Command, Rock Island, Ill.

—**Bell Helicopter Co.**, Fort Worth, Tex. $1,350,000. UH-1E helicopters for the Navy. Hurst, Tex. Army Aviation Materiel Command, St. Louis, Mo.

—**Global Associates**, Oakland, Calif. $4,069,037. Aircraft maintenance and operations. Kwajalein Test Site, Marshall Islands. Redstone Arsenal, Huntsville, Ala.

—**Aero Service Corp.**, Philadelphia, Pa. $5,143,630. Aerial mapping work. Philadelphia. Army Map Service, Washington, D.C.

13—**Norris Industries**, Vernon, Calif. $1,470,192. Training projectiles. Vernon. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**J. A. Jones Construction Co.**, Nashville, Tenn. $21,614,500. Rehabilitation and reactivation of two production lines with supporting facilities at the Holston Army Ammunition Plant, Kingsport, Tenn. Engineer Dist., Mobile, Ala.

—**Raytheon Co.**, Lexington, Mass. $4,013,020. Retrofit kits for the Hawk missile system. Andover, Mass. Army Missile Command, Huntsville, Ala.

—**Mason & Hanger, Silas Mason & Co.**, Lexington, Ky. $1,136,618. Loading, assembling and packing of ammunition. Burlington, Iowa. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Northrop Corp.**, Anaheim, Calif. $2,270,448. Facilities to produce ordnance projectiles. Anaheim. Picatinny Arsenal, Dover, N.J.

—**McCarthy Bros. Construction Co.**, Ladue, Mo. $3,876,324. Work on the St. Louis Flood Protection Project. St. Louis. Engineer Dist., St Louis, Mo.

—**Karam Construction Co.**, El Paso, Tex. $3,132,273. Construction of 30 one-story enlisted men's barracks; three mess halls; three headquarters and classroom buildings; and all supporting utilities. Fort Bliss, Tex. Engineer Dist., Albuquerque, N.M.

—**A. G. Schoonmaker Co.**, Sausalito, Calif. $2,537,101. Construction of a land based power plant on Kwajalein Atoll. Engineer Dist., Honolulu, Hawaii.

16—**General Tire & Rubber Co.**, Akron, Ohio. $1,551,636. Pneumatic tires for use on various trucks, trailers and semi-trailers. Waco, Tex. Army Tank Automotive Command, Warren, Mich.

—**R. G. LeTourneau, Inc.**, Longview, Tex. $3,154,800. Metal parts for 750-lb bombs. Longview. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Fontaine Truck Equipment Co.**, Birmingham, Ala. $2,532,948. 25-ton semi-trailers. Haleysville, Ala. Army Tank Automotive Command, Warren, Mich.

—**Amron Corp.**, Waukesha, Wis. $1,300,000. Brass cups for 20mm M103 cartridge cases. Waukesha. Frankford Arsenal, Philadelphia, Pa.

—**Kellett Aircraft Corp.**, Willow Grove, Pa. $1,000,000. Field photographic laboratories and components. Willow Grove. Army Electronics Command, Philadelphia, Pa.

—**Ford Motors**, Dearborn, Mich. $2,844,119. Trucks. Lorain, Ohio. Army Tank Automotive Center, Warren, Mich.

—**Jackes-Evans Mfg. Co.**, St. Louis, Mo. $2,140,610. 7.62mm cartridge belt links. St. Louis. Frankford Arsenal, Philadelphia, Pa.

—**AVCO Corp.**, Stratford, Conn. $1,404,000. T53-L-15 engines for the OV-1 helicopter (Mohawk). Stratford. Army Aviation Materiel Command, St. Louis, Mo.

18—**Hesse-Eastern Division of Norris Industries**, Everett, Mass. $2,277,085. 66mm rocket launchers. Brockton, Mass. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Gibb Mfg. & Research Corp.**, Janesville, Wis. $1,135,350. Fuze adapters for use on 81mm mortar cartridges. Janesville. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Eureka Williams Co.**, Bloomington, Ill. $1,450,240. Hand grenade fuze assemblies. Bloomington. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Talley Industries**, Mesa, Ariz. $2,810,667. Hand grenades. Mesa. Edgewood Arsenal, Md.

—**Robert E. McKee General Contractors, Inc.**, Santa Fe, N.M. $3,912,655. Work on the Albuquerque Diversion Channel Project. Albuquerque, N.M. Engineer Dist., Albuquerque, N.M.

19—**Thurmont Construction Co.**, Thurmont, Md. $1,337,489. Construction at Fort Detrick, Md. Engineer Dist., Baltimore, Md.

—**Philco-Ford Corp.**, Newport Beach, Calif. $1,377,805. 40mm grenade launchers. Newport Beach. Army Weapons Command, Rock Island, Ill.

20—**Sperry Rand Corp.**, New York City, N.Y. $17,846,914. Ordnance items. Shreveport, La. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Remington Arms Co.**, Bridgeport, Conn. $2,494,560. Miscellaneous small arms ammunition. Independence, Mo. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Mason & Hanger, Silas Mason & Co.**, Lexington, Ky. $21,907,370. Classified items. Burlington, Iowa. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**U.S. Rubber Co.**, New York City, N.Y. $12,556,139. Ordnance items and additional reactivation funds and O&MA activities. Joliet, Ill. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Raytheon Co.**, Bristol, Tenn. $1,936,026. Metal fuze parts for 750-lb bombs. Bristol. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**MEVA Corp.**, Cocoa, Fla. $1,223,796. Power system supervisory controls, telemetry and capacitor installation for launch complex 39. Merritt Island, Fla. Engineer Dist., Merritt Island, Fla.

—**General Motors**, Indianapolis, Ind. $7,473,600. T63-A-5A engines and data for LOH aircraft. Indianapolis. Army Aviation Materiel Command, St. Louis, Mo.

—**General Electric**, Burlington, Mass. $2,509,200. M-85 machine guns and inspection and test equipment. Springfield, Mass. Army Weapons Command, Rock Island, Ill.

23—**Day & Zimmerman**, Philadelphia, Pa. $7,613,452. Loading, assembling and packing of medium caliber ammunition and miscellaneous components. Philadelphia. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Hercules Engines**, Canton, Ohio. $4,521,000. Multi-fuel engine assemblies for five-ton trucks. Canton. Army Tank Automotive Command, Warren, Mich.

—**Stolte, Inc.**, Oakland, Calif. $2,012,048. Construction of two 180-man, five-story bachelor officers quarters at Camp Kue and Machinato Service Area, Okinawa. Engineer Dist., Okinawa.

—**Sante Fe Engineers and Stolte, Inc., and DBA S&S Constructions**, Lancaster, Calif. $17,217,217. Construction of Space Launch Complex No. 6 at Vandenberg AFB, Calif. Engineer Dist., Los Angeles, Calif.

—**Olin Mathieson Chemical Corp.**, New Haven, Conn. $1,196,000. 20mm cartridges. LaPorte, Ind. Frankford Arsenal, Philadelphia, Pa.

25—**Lakeside Bridge and Steel Co.**, Milwaukee, Wis. $1,127,247. Work on the Ozark Lock and Dam, Arkansas River, Project. Ozark, Ark. Engineer Dist., Little Rock, Ark.

26—**RCA**, Camden, N.J. $7,419,982. Radio sets. Camden. Army Electronics Command, Philadelphia, Pa.

—**Intercontinental Mfg. Co.**, Garland, Tex. $2,421,100. Metal parts for Nike-Hercules rocket motors. Garland. Army Missile Command, Huntsville, Ala.

27—**Chrysler Motors**, Detroit, Mich. $1,014,523. One-ton cargo trucks and ambulances. Warren, Mich. Army Tank Automotive Command, Warren, Mich.

—**Sperry Rand Corp.**, St. Paul, Minn. $6,500,000. Classified electronics equipment. St. Paul. Army Electronics Command. Fort Monmouth, N.J.

—**A. O. Smith Corp.**, Chicago, Ill. $7,910,789. Metal parts for demolition bombs. Waco, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**American Machine & Foundry Co.**, Brooklyn, N.Y. $3,233,272. Metal parts for demolition bombs. Garden City, N.Y. Ammunition Procurement & Supply Agency, Joliet, Ill.

30—**Hercules, Inc.**, Wilmington, Del. $7,553,114. Grain propellant and operations and maintenance activities. Lawrence, Kan. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Hughes Aircraft**, Fullerton, Calif. $1,748,938. Engineering services in support of the Air Defense Fire Distribution System. Fullerton. Army Missile Command, Huntsville, Ala.

—**General Motors**, Detroit, Mich. $2,168,163. Trucks. Detroit. Army Tank Automotive Command, Warren, Mich.

—**International Harvester Co.**, Chicago, Ill. $2,623,156. Buses. Lima, Ohio. Army Tank Automotive Command, Warren, Mich.

—**Olin Mathieson Chemical Corp.**, East Alton, Ill. $4,640,556. 20mm cartridge propellant. East Alton. Frankford Arsenal, Philadelphia, Pa.

—**DeMauro Construction Corp.**, Naha, Okinawa. $1,602,185. Construction of various buildings and their exterior utilities at Machinato Service Area, Okinawa. Engineer Dist., Okinawa.

31—**Hercules, Inc.**, Wilmington, Del. $4,506,535. Miscellaneous propellants and explosives and operations and maintenance activities. Radford, Va. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**National Gypsum Co.**, Buffalo, N.Y. $8,580,784. Classified items and operations and maintenance activities. Parsons, Kan. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Harvey Aluminum Sales, Inc.**, Torrance, Calif. $1,040,464. Classified items and operations and maintenance activities. Milan, Tenn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Thiokol Chemical Corp.**, Bristol, Pa. $22,710,525. Loading, assembling and packing of miscellaneous illuminating projectiles and operations and maintenance activities. Marshall, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Olin Mathieson Chemical Corp.**, East Alton, Ill. $5,497,048. Activation of rocket propellant facilities and operations and maintenance activities. Baraboo, Wis. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Olin Mathieson Chemical Corp.**, East Alton, Ill. $1,597,064. 7.62mm cartridges. East Alton. Frankford Arsenal, Philadelphia, Pa.

—**Olin Mathieson Chemical Corp.**, East Alton, Ill. $1,628,937. 5.56mm cartridges. East Alton. Frankford Arsenal, Philadelphia.

—**Olin Mathieson Chemical Corp.**, East Alton, Ill. $4,203,586. 7.62mm cartridges. East Alton. Frankford Arsenal, Philadelphia.

—**Olin Mathieson**, New Haven, Conn. $5,810,264. 7.62mm cartridges. New Haven. Frankford Arsenal, Philadelphia, Pa.

—**Federal Cartridge Corp.**, Anoka, Minn. $1,946,670. 5.56mm cartridges. Anoka. Frankford Arsenal, Philadelphia, Pa.

—**Remington Arms Co.**, Bridgeport, Conn. $2,802,514. 5.56mm cartridges. Bridgeport. Frankford Arsenal, Philadelphia, Pa.

—**Remington Arms Co.**, Bridgeport, Conn. $4,937,920. 1.62mm and 7.62mm cartridges. Bridgeport. Frankford Arsenal, Philadelphia, Pa.

—**Amron Corp.**, Waukesha, Wis. $1,024,[illegible] 20mm projectiles. Waukesha. Frankford Arsenal, Philadelphia, Pa.

—**Chrysler Corp.**, Centerline, Mich. $1,222,703. Engineering services in support of M60A1E2, M60A1, M48A3 and M48A4 combat tanks. Centerline. Army Tank Automotive Center, Warren, Mich.

—**International Harvester Co.**, Chicago, Ill. $1,308,307. Tractor trucks. Fort Wayne, Ind. Army Tank Automotive Center, Warren, Mich.

—**Johnson Corp.**, Bellevue, Ohio. $3,147,328. Chasis trailers for 3½-ton M353 vehicles.

Bellevue. Army Tank Automotive Center, Warren, Mich.

—Loadcraft, Inc., Denton, Tex. $1,023,568. Six-ton semi-trailers. Brady, Tex. Army Tank Automotive Center, Warren, Mich.

—RCA, Camden, N.J. $3,062,620. Radio sets and additional technical requirements. Camden. Army Electronics Command, Philadelphia, Pa.

—General Dynamics, Rochester, N.Y. $1,607,-088. Radio sets and components. Rochester. Army Electronics Command, Philadelphia, Pa.

—Brunswick Corp., Sugar Grove, Va. $1,-167,381. Bombs. Sugar Grove. Edgewood Arsenal, Md.

—Mine Safety Appliance Co., Pittsburgh, Pa. $2,054,500. Field protective masks. Esmond, R.I. Edgewood Arsenal, Md.

AVCO Corp., Stratford, Conn. $4,502,413. Turbine nozzles and gear box assemblies for T-53 turbine engines. Stratford. Army Aviation Materiel Command, St. Louis, Mo.

—Hughes Tool Co., Culver City, Calif. $4,-760,400. Light observation helicopters and related special tools. Culver City. Army Aviation Materiel Command, St. Louis, Mo.

NAVY

3 Sylvania Electric Products, Mountain View, Calif. $2,000,000. Direction finder equipment. Mountain View. Naval Ship Systems Command.

—Dyson & Co., Pensacola, Fla. $1,432,000. Construction of an aircraft rework hangar at the Pensacola, Fla., Naval Air Station. Southeast Div., Naval Facilities Engineering Command.

—Harvey Aluminum, Torrance, Calif. $1,-726,387. MK14 MOD 0, 20mm projectiles. Torrance. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—Chaney & James Co., Richardson, Tex. $1,-414,000. Construction of an 800-unit airmen's dormitory at Barksdale AFB, La. Gulf Div., Naval Facilities Engineering Command.

4 Grumman Aircraft Engineering Corp., Bethpage, N.Y. $22,550,000. A-6A aircraft. Bethpage. Naval Air Systems Command.

—LTV Aerospace Corp., Dallas, Tex. $36,-600,614. A-7B aircraft. Dallas. Naval Air Systems Command.

United Aircraft, Stratford, Conn. $1,400,-000. Long lead time effort and materials to support procurement of HH-3E helicopters for the Air Force. Stratford. Naval Air Systems Command.

McDonnell Co., St. Louis, Mo. $134,604,-533. F-4E aircraft for the Air Force. St. Louis. Naval Air Systems Command.

Boeing Co., Morton, Pa. $18,270,000. CH-46D helicopters. Naval Air Systems Command.

—Lockheed Aircraft, Burbank, Calif. $12,-120,000. Long lead time effort and materials to support FY 1967 procuremtnt of P-3B aircraft. Burbank. Naval Air Systems Command.

U. S. Steel, Pittsburgh, Pa. $1,330,881. Bullpup guided missile warheads. McKeesport, Pa. Naval Air Systems Command.

Peterson Builders, Sturgeon Bay, Wis. $5,-824,200. Construction of three coastal minesweepers. Sturgeon Bay. Naval Ship Systems Command.

—Liberty Aero, Inc., Farmingdale, N.Y. $1,230,292. LAW-34/A guided missile launchers. Farmingdale. Navy Purchasing Office, Washington, D.C.

—Balfield Industries, Carrollton, Tex. $11,-120,137. Mark 15 retard fins used with MK 82 bombs. Carrollton, Tex. and Shreveport, La. Navy Ships Parts Control Center, Mechanicsburg, Pa.

5 —United Aircraft, Windsor Locks, Conn. $1,460,000. Propeller systems used on P-3B aircraft. Windsor Locks. Navy Aviation Supply Office, Philadelphia, Pa.

—Lasko Metal Products, Inc., Westchester, Pa. $3,104,064. Mark 14 bomb fins assemblies used on 250-lb MK 81 bombs. Westchester. Navy Ships Parts Control Center, Mechanicsburg, Pa.

6 —Westinghouse Electric, Baltimore, Md. $4,-406,000. AN/APQ-109 radar for the Air Force. Baltimore. Naval Air Systems Command.

—Teledyne Systems, Hawthorne, Calif. $8,-000,000. Self-contained navigation systems. Hawthorne. Naval Air Systems Command.

—United Aircraft, Stratford, Conn. $4,869,-600. SH-3D helicopters. Bridgeport, Conn. Naval Air Systems Command.

—Boeing Co., Morton, Pa. $19,597,696. CH-46A and UH-46A helicopters. Morton. Naval Air Systems Command.

—Sanders Associates, Nashua, N.H. $2,790,-645. Design, fabrication and test of classified electronics equipment. Nashua. Naval Ship Systems Command.

9—Grumman Aircraft Engineering Corp., Bethpage, L.I., N.Y. $10,000,000. Research and development work on EA6B aircraft. Bethpage. Naval Air Systems Command.

—Nacirema Operating Co., Baltimore, Md. $1,477,992. On-base stevedoring services and terminal warehousing operations. Naval Operating Base, Norfolk. Naval Supply Center, Norfolk, Va.

—Sperry Gyroscope Co., Great Neck, N.Y. $1,773,210. Repair parts for navigational equipment used on Polaris submarines. Great Neck. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—Todd Shipyards, San Pedro, Calif. $1,698,-738. Topside overhaul of the oiler USS PLATTE (AO-24). San Pedro. Naval Ship Systems Command.

10 —Hughes Aircraft, Fullerton, Calif. $1,690,-700. Design, development, and test of nine beacon video processors, and associated equipment for the Naval Tactical Data System. Fullerton. Naval Ship Systems Command.

Todd Shipyards, Seattle, Wash. $1,592,308. Regular overhaul of the landing ship, dock USS Whetstone (LSD 27). Seattle. Supervisor of Shipbuilding, 13th Naval Dist., Seattle, Wash.

Maxson Electronics Corp., Macon, Ga. $1,-262,134. Detonation primers for five-inch projectiles. Macon. Navy Ships Parts Control Center, Mechanicsburg, Pa.

Columbus Milpar & Mfg. Co., Columbus, Ohio. $3,843,300. Bomb fins. Columbus. Navy Ships Parts Control Center, Mechanicsburg, Pa.

11 General Motors, Indianapolis, Ind. $1,440,-700. Development and testing of a gas turbine engine for VS(X) ASW missions. Indianapolis. Naval Air Systems Command.

—LTV Aerospace Corp., Dallas, Tex. $4,-000,000. Long lead time effort to support FY 1968 procurement of materials to extend service life of F-8A/B/C aircraft. Dallas. Naval Air Systems Command.

—General Electric, West Lynn, Mass. $1,-560,300. Development and testing of a gas turbine engine for VX(X) ASW missions. West Lynn. Naval Air Systems Command.

—McDonnell Co., St. Louis, Mo. $53,000,000. F-4E and RF-4C aircraft for the Air Force. St. Louis. Naval Air Systems Command.

12 TRW Inc., Redondo Beach, Calif. $12,054,-987. Performance of system analysis and engineering laboratory experimentation for anti-submarine warfare systems. Redondo Beach. Naval Ordnance Systems Command.

—RCA, Harrison, N.J. $2,001,376. Electron tubes for shipboard surface-search radar systems. Harrison. Navy Electronics Supply Office, Great Lakes, Ill.

General Instrument Corp., Chicopee, Mass. $1,384,700. Bomb fuzes. Chicopee. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—Lansdowne Steel & Iron Co., Morton, Pa. $1,464,460. Projectiles for five-inch 54 caliber guns. Morton. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—Westinghouse Electric, Baltimore, Md. $1,-349,470. Radar components. Baltimore. Naval Air Systems Command.

—Melpar, Inc., Falls Church, Va. $1,106,900. Subsystems for airborne radar homing and warning sets. Falls Church. Naval Air Systems Command.

—Goodyear Aerospace Corp., Akron, Ohio. $4,500,000. SUBROC missiles and related equipment. Akron. Naval Ordnance Systems Command.

16 —Westinghouse Electric, Washington, D.C. $1,103,938. Polaris launcher equipment. Sunnyvale, Calif. Special Project Office.

—Hughes Aircraft, Fullerton, Calif. $1,308,-532. Ships command and control system equipment for the Naval Tactical Data System. Fullerton. Naval Ship Systems Command.

—Magnavox Co., Fort Wayne, Ind. $1,000,-000. Development of an air droppable ASW sonobuoy system. Fort Wayne. Naval Air Systems Command.

—Lear Siegler, Inc., Grand Rapids, Mich. $4,500,000. Overhaul, modification and warrantee of AN/AJB-3A gyroscopes used on various attack and fighter aircraft. Grand Rapids, Mich. and Los Angeles, Calif. Navy Aviation Supply Office, Philadelphia, Pa.

17—FMC Corp., San Jose, Calif. $1,981,463. Design and conversion of an experimental landing craft. San Jose. Naval Ship Systems Command.

—Harvell-Kilgore Corp., Toone, Tenn. $1,-929,738. MK25, MOD 3 marine markers used in anti-submarine warfare. Toone. Naval Ships Parts Control Center, Mechanicsburg, Pa.

—FMC Corp., Minneapolis, Minn. $1,951,845. Major components of the 5"/54 naval gun mount. Minneapolis. Naval Ordnance Station, Louisville, Ky.

—Western Electric, New York City, N.Y. $9,953,000. Oceanographic research. Whippany, N.J., Navy Purchasing Office, Washington, D.C.

18 —United Boatbuilders, Inc., Bellingham, Wash. $1,070,000. Eight 36-foot hydrographic survey launches. Bellingham. Naval Ship Systems Command.

—AVCO Corp., Stratford, Conn. $1,737,040. Constant speed drives for Navy aircraft. Stratford. Naval Air Systems Command.

—American Mfg. Co. of Tex., Fort Worth, Tex. $6,732,205. MK 25, MOD O projectiles used in ammunition for 5"/38 naval guns. Fort Worth. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—Lansdowne Steel & Iron Co., Morton, Pa. $3,134,535. MK 25, MOD O projectiles used in ammunition for 5"/38 naval guns. Morton. Navy Ships Parts Control Center, Mechanicsburg, Pa.

19 —Lockheed Aircraft Corp., Marietta, Ga. $3,258,000. Progressive aircraft rework on C-130 aircraft. Marietta. Naval Air Systems Command.

—Sanders Associates, Nashua, N.H. $10,-638,510. Classified electronic equipment. Nashua. Naval Air Systems Command.

—Westinghouse Electric Corp., Washington, D.C. $51,701,833. Development of launcher and handling equipment for the Poseidon missile. Sunnyvale, Calif. Special Projects Office.

Sperry Rand Corp., Syosset, N.Y. $1,820,-000. Technical assistance in support of the overhaul of the navigation subsystems aboard four Polaris submarines. Newport News, Va.; Portsmouth, N.H.; and Charleston, S.C. Naval Ship Systems Command.

20 Control Data Corp., Minneapolis, Minn. $2,362,000. Control Data 6400 Computer System for the Fleet Numerical Weather Facility, Monterey, Calif. Arden Hills, Minn. Naval Postgraduate School, Monterey, Calif.

—Sperry Rand Corp., Bristol, Tenn. $3,405,-247. Engineering services associated with the design and test evaluation effort for guidance and control sections of the Shrike Weapons System. Bristol. Navy Purchasing Office, Los Angeles, Calif.

—Jered Industries, Birmingham, Mich. $2,-041,024. Three deck edge elevators used to move aircraft aboard the aircraft carrier USS Midway (CVA 41). Birmingham. Naval Supply Center, Oakland, Calif.

—Lockheed Missiles & Space Co., Sunnyvale, Calif. $3,795,438. Poseidon research and development facilities. Sunnyvale. Special Projects Office.

—Sanders Associates, Nashua, N.H. $2,729,-572. Classified training device. Nashua. Naval Training Device Center, Orlando, Fla.

23—Norris Industries, Los Angeles, Calif. $1,-683,459. Cartridge cases for 38 and 54-caliber projectiles. Vernon, Calif. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—Collins Radio Co., Cedar Rapids, Iowa. $3,-083,607. Radio sets, accessory kits and repair parts for Navy ship and shore establishments. Cedar Rapids. Naval Ship Systems Command.

—Sanders Associates, Nashua, N.H. $1,-100,830. Classified electronic equipment. Nashua. Naval Air Systems Command.

—LTV Electrosystems, Greenville, Tex. $1,-034,723. Design, installation and testing of two electronic systems, associated equipment, supplies and services, technical documentation and reports. Bremerton, Wash. and Greenville. Naval Ship Systems Command.

24—Therm-Air Mfg. Co., York, Pa. $1,002,140. Air conditioners and related data. York. Naval Ship Systems Command.

—United Aircraft, East Hartford, Conn. $40,-025,200. TF30-P-3 engines for the Air Force. East Hartford. Naval Air Systems Command.

—Sperry Rand Corp., Syosset, N.Y. $16,-9'8,000. Phase II development of inertial navigation subsystems for the Poseidon program for Fleet Ballistic Missile Submarines. Syosset. Naval Ship Systems Command.

—Lasko Metal Products, Westchester, Pa. $2,216,046. LAV-10A launchers for the Zuni rocket. Westchester. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—Collins Radio Co., Cedar Rapids, Iowa. $1,-339,677. Components of airborne radio communication equipment. Cedar Rapids. Navy Aviation Supply Office, Philadelphia, Pa.

25—Alsco, Inc., St. Louis, Mo. $4,091,639. Rocket launchers. St. Louis. Naval Air Systems Command.

—Otis Elevator Co., Stamford, Conn. $2,-000,000. Production of unit trainer devices for the Sheridan Weapon System. Stamford. Naval Training Device Center, Orlando. Fla.

26—Belock Instrument Corp., College Point, N.Y. $2,153,810. Gyros for gun platform stabilization. College Point. Naval Ordnance Systems Command.

27—Lockheed Aircraft, Marietta, Ga. $7,600,-000. EC-130 aircraft. Marietta. Naval Air Systems Command.

—Martin Marietta, Washington, D.C. $2,-400,000. Classified work on Navy aircraft. Middle River, Md. Naval Air Systems Command.

—Manpower, Inc., Milwaukee, Wis. $1,967,-426. Mess attendants and for food handling services at the Naval Training Center, Great Lakes, Ill. Naval Training Center, Great Lakes, Ill.

—Grumman Aircraft Engineering Corp., Bethpage, N.Y. $1,005,785. Airframe spare parts for A-6A aircraft. Bethpage. Naval Aviation Supply Office, Philadelphia, Pa.

30—Sanders Associates, Inc., Nashua, N.H. $1,-466,593. Electronic equipment. Nashua. Naval Air Systems Command.

—Martin-Marietta, Orlando, Fla. $34,520,-170. Walleye guided weapons. Orlando. Naval Air Systems Command.

—Sperry Rand Corp., Great Neck, N.Y. $3,-000,000. Additional prototype models of the Phase II integrated light attack avionics system. Great Neck. Naval Air Systems Command.

31—North American Aviation, Inc., Anaheim, Calif. $1,963,760. Design and fabrication of one development model of a digital disk file memory bank for computing equipment. Anaheim. Naval Ship Systems Command.

—Lockheed Missiles & Space Co., Sunnyvale, Calif. $1,484,660. Polaris missile modification kits. Sunnyvale. Special Projects Office.

Raytheon Co., Lexington, Mass. $1,506,027. Additional service model dual radar sets. North Dighton, Mass. Naval Ordnance Systems Command.

—Aluminum Company of America, Pittsburgh, Pa. $2,638,944. Aluminum extrusions used to manufacture AM2 airfield landing mats. Lafayette, Ind. Naval Air Engineering Center, Philadelphia, Pa.

—Dow Chemical Co., Midland, Mich. $4,-677,759. Aluminum extrusions used to manufacture AM2 airfield landing mats. Madison, Ill. Naval Air Engineering Center, Philadelphia, Pa.

—Washington Aluminum Co., Baltimore, Md. $1,457,659. Fabrication of AM2 aluminum airfield landing mats and pallet assemblies. Enterprise, Ala. Naval Air Engineering Center, Philadelphia, Pa.

—Harvey Aluminum, Inc., Torrance, Calif. $4,091,655. AM2 aluminum airfield landing mats and pallet assemblies. Torrance. Naval Air Engineering Center, Philadelphia, Pa.

MARINE CORPS

19—Gould National Batteries, St. Paul, Minn. $2,216,861. Production of batteries for use in ANPRC/47 and ANPRC/41 radios. St. Paul. Headquarters, Marine Corps.

AIR FORCE

4—Douglas Aircraft, Tulsa, Okla. $2,000,000. Non-recurring maintenance of Air Force Plant #3. Tulsa. Aeronautical Systems Div., (AFSC), Wright-Patterson, AFB, Ohio.

—North American Aviation, Anaheim, Calif. $1,536,145. Production of spare parts for the Minuteman missile. Anaheim. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

—Boeing Co., Wichita, Kan. $3,004,380. Modification of B-52 aircraft. Wichita. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

—Thompson-Ramo-Wooldridge, Inc., Redondo Beach, Calif. $1,235,393. Production of airborne tactical reconnaissance equipment. Redondo Beach. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

5—Hughes Aircraft, Culver City, Calif. $1,-875,532. Checkout and testing of the Minuteman guidance system. Culver City. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

—Lockheed Missiles & Space Co., Sunnyvale, Calif. $3,000,000. Engineering services in support of the Agena space vehicle program. Sunnyvale. Space Systems Div., (AFSC), Los Angeles, Calif.

6—System Development Corp., Santa Monica, Calif. $12,570,000. Updating of computers and preparation of system training programs. Santa Monica. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

—Boeing Co., Wichita, Kan. $1,243,008. Field modification services for B-52 aircraft. Barksdale AFB, La. and Castle AFB, Calif. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

—General Motors, Allison Div., Indianapolis, Ind. $13,500,000. Development and production of a new turbofan engine for the Air Force A07D subsonic attack aircraft. Indianapolis. Aeronautical Systems Div., (AFSC) Wright-Patterson AFB, Ohio.

9—Sperry Rand Corp., Phoenix, Ariz. $1,-674, 840. Aircraft gyroscope compass systems. Phoenix. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Lear Siegler, Inc., Grand Rapids, Mich. $1,133,139. Production of aircraft bombing computers. Grand Rapids. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

10—General Dynamics, Fort Worth, Tex. $1,-677,956. Engineering support services for B-58 aircraft. Fort Worth. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

—AVCO Corp., Richmond, Ind. $2,600,000. Production of bomb fuzes and related equipment. Richmond. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Cessna Aircraft, Wichita, Kan. $1,640,000. Production of T-37 aircraft and related equipment. Wichita. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Aluminum Company of America, Cleveland, Ohio. $3,143,500. Installation of machine tools and production equipment. Cleveland. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Dynalectron Corp., Fort Worth, Tex. $2,-100,000. Repair and maintenance of F-4C aircraft. George AFB, Calif. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

—Douglas Aircraft Co., Santa Monica, Calif. $2,759,426. Launch support services at Vandenberg AFB, Calif. Space Systems Div., (AFSC), Los Angeles, Calif.

—Aerojet-General Corp., Sacramento, Calif. $2,203,000. Research, development, and production of Stage III Minuteman missile motors. Sacramento. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—Cullman Metalcraft, Inc., Cullman, Ala. $1,331,200. Production of bomblet dispensers. Cullman. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

11—Hughes Aircraft, Culver City, Calif. $4,-485,773. Modification of air defense radar systems. Los Angeles. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—Honeywell, Inc., Hopkins, Minn. $4,814,-800. Production of bombs and related equipment. Hopkins. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB), Ohio.

—Maxson Electronics Corp., Macon, Ga. $8,-467,585. Production of bomb fuze components. Macon. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

—Marquardt Corp., Van Nuys, Calif. $1,-500,000. Work on a hypersonic Ramjet engine program. Van Nuys. Systems Engineering Group, Research & Technology Div., (AFSC), Wright-Patterson AFB, Ohio.

—Hughes Aircraft, El Segundo, Calif. $9,-000,000. Research and development of an experimental communications satellite. El Segundo. Space Systems Div., (AFSC), Los Angeles, Calif.

12—Collins Radio Co., Cedar Rapids, Iowa. $1,007,720. Production of communications equipment for F-111 aircraft. Cedar Rapids. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Aerodex, Inc., Miami, Fla. $1,589,801. Overhaul of J-57 aircraft engines. Miami. San Antonio Air Materiel Area (AFLC), Kelly AFB, Tex.

—TRW Inc., Redondo Beach, Calif. $2,500,-000. Feasibility studies of penetration aids. Redondo Beach. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

13—Goodyear Aerospace Corp., Litchfield Park, Ariz. $1,605,410. Production of components for radar mapping systems. Litchfield Park. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—General Electric, West Lynn, Mass. $3,-297,100. Production of J-85 aircraft engines. West Lynn. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Lockheed Missiles & Space Co., Sunnyvale, Calif. $2,382,263. Launch services at Vandenberg AFB, Calif. Sunnyvale. Space Systems Div., (AFSC), Los Angeles, Calif.

—Sperry Rand Corp., Great Neck, N.Y. $1,-000,000. Modification of bomb navigation systems on B-58 aircraft. Great Neck. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

16—Ladish Co., Cudahy, Wis. $1,000,000. Acquisition and installation of machine tools at Air Force Plant Number 58. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—I.B.M., Owego, N.Y. $1,500,000. Production of data processing equipment. Owego. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

17—Taylor Forge & Pipe Works, Chicago, Ill. $2,328,512. Acquisition and installation of machine tools and production equipment to support Air Force programs. Chicago. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

18—General Electric, West Lynn, Mass. $2,-500,000. 1967 component improvement engineering program for J-85 engines. West Lynn. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

19—Condec Corp., Statford, Conn. $12,293,303. Production of fuel servicing tank trucks. Stamford. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—National Lead Co., Toledo, Ohio. $3,480,-000. Production of bomb components. Toledo. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Sylvania Electric Products, Needham Heights, Mass. $3,150,000. Engineering support relative to the ground electronic system of the Minuteman missile program. Needham Heights. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—Hughes Aircraft, Culver City, Calif. $1,-640,289. Spare components and spare parts for F-106 aircraft air weapons control systems. Culver City. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—North American Aviation, Anaheim, Calif. $1,570,000. Production of airborne navigational equipment. Anaheim. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

20—International Telephone & Telegraph Corp., Nutley, N.J. $1,064,000. Production of navigational equipment for C-141 and HC-130 aircraft. Nutley. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Talley Industries, Mesa, Ariz. $1,825,810. Production of aircraft engine starter cartridges. Mesa. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Texas Instruments, Dallas, Tex. $1,169,-962. Production of infrared detecting equipment for F-4 aircraft. Dallas. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—United Aircraft, Sunnyvale, Calif. $5,-864,050. Design, development, fabrication, delivery and flight testing of large segmented solid propellant motors. Sunnyvale.

Space Systems Div., (AFSC), Los Angeles, Calif.

23—Texas Instruments, Dallas, Tex. $1,571,026. Production of spare parts for the radar system on RF-4C aircraft. Dallas. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—Douglas Aircraft, Santa Monica, Calif. $2,587,861. Conversion of Thor missiles to standard launch space boosters. Santa Monica. Space Systems Div., (AFSC), Los Angeles, Calif.

—General Electric, Arkansas City, Kan. $1,422,546. Overhaul and modification of J-85 engines and components. Arkansas City. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

—Cessna Aircraft, Wichita, Kan. $8,600,000. Procurement of A-37B aircraft, spare parts, aerospace ground equipment and data. Wichita. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

24—AVCO Corp., Wilmington, Mass. $1,624,744. Design, development, fabrication, test and evaluation of Minuteman Mark 11A re-entry vehicles. Wilmington. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

25—Philco-Ford Corp., Palo Alto, Calif. $2,500,000. Work on a satellite control network. Palo Alto. Air Force Satellite Control Facility, (AFSC), Los Angeles, Calif.

26—IBM Corp., Owego, N.Y. $1,000,000. Aircraft avionics systems. Owego. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Olin Mathieson Chemical Corp., East Alton, Ill. $1,830,680. Cartridge type engine starters for aircraft Marion Ill. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Lockheed Aircraft Corp., Burbank, Calif. $1,483,928. Non-recurring maintenance activities at Air Force Plant No. 14. Burbank. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Kollsman Instrument Corp., Elmhurst, N.Y. $2,282,280. Production of altimeters for Navy and Air Force aircraft. Elmhurst. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—LTV Electrosystems, Inc., Greenville, Tex. $2,000,000. Production of airborne command and control systems. Greenville. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

27—General Motors, Indianapolis, Ind. $1,605,000. Production of T-56 engines and related data. Indianapolis. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—General Electric, West Lynn, Mass. $4,050,000. Component improvement programs for the T-58 and T-64 helicopter engines. West Lynn. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—LTV Aerospace Corp., Dallas, Tex. $1,505,757. Work on the XC-142 tri-service transport. Dallas. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB Ohio.

—Northrop Corp., Hawthorne, Calif. $5,171,037. Production of T-38 aircraft and related equipment. Hawthorne. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

31—General Motors, Indianapolis, Ind. $1,759,748. Development of an advanced gas turbine generator. Indianapolis. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Lockheed Aircraft, Burbank, Calif. $7,850,000. Modification of C-121 aircraft. Burbank. Sacramento Air Materiel Area. (AFLC), McClellan AFB, Calif.

—United Technology Center, Sunnyvale, Calif. $2,977,040. Procurement of TITAN III Manned Orbiting Laboratory (MOL) Long lead hardware for solid rocket motors. Sunnyvale. Space Systems Div., (AFSC), Los Angeles, Calif.

—AVCO Corp., Wilmington, Mass. $3,500,000. Work on a re-entry vehicle program. Wilmington. Ballistics Systems Div., (AFSC), Norton AFB, Calif.

—Textron, Inc., Grants Pass, Ore. $2,878,017. Weapons ejector racks for F-4C aircraft. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—Kaman Aircraft Corp., Bloomfield, Conn. $2,049,967. Production of HH-43 helicopter components. Bloomfield. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

Air Force Buys New Forward Controller Aircraft

The U.S. Air Force has purchased 176 Cessna "Super Skymaster" Model 337 aircraft to be used primarily in forward air controller (FAC), liaison and observation functions and a few to be modified for use in psychological warfare.

The Aeronautical Systems Div., Air Force Systems Command, awarded a $4.5 million letter contract to Cessna Aircraft Co., Wichita, Kan., Dec. 29 as part of an estimated $11.7 million definitive contract for the aircraft.

First production aircraft will be available to begin aircrew training in the spring of 1967. The first squadron will be operational in mid-1967.

The new plane, designated the O-2, will be a one-for-one replacement of the O-1 Cessna "Bird Dog" in the Airborne Forward Air Controller mission.

The O-2 is a high-wing, all metal aircraft with retractable tricycle landing gear. Two engine reliability and ease in handling under varied power conditions are gained through its unique center line mounted, opposed twin engines, one forward and one aft of the cabin between the twin tail booms. The O-2 has dual, side-by-side pilot controls plus provisions for carrying up to four passengers or equivalent cargo in the cabin. Its low cost and minimum maintenance needs suit remote site operation.

Air Force Tests New Gyroscope

The U.S. Air Force is testing a new electrostatic gyroscope (ESG)—part of a highly accurate inertial navigation system—which operates without wheels, axles, or contacting surfaces by using electrically charged plates to suspend a rotating hollow sphere.

Honeywell, Inc., has been contracted by the Air Force Avionics Laboratory, Wright-Patterson AFB, Ohio, to develop the concept. The ESG is being flight tested as a part of a stabilized platform with associated electronics on a C-124 aircraft.

Air Force technicians expect a high degree of reliability from the ESG and predict a capability of operating over extensive environment ranges. In addition, it can be used in either a gimballed or strap-down system. Because of these characteristics, the ESG is particularly adaptable to satellites and space vehicles, as well as aircraft.

Project engineer Captain Eugene J. DeNezza explains that the ESG has unusual accuracy because the rotating beryllium sphere "floats" in an evacuated area surrounded by charged electrodes. This kind of suspension eliminates friction, the main source of drift or inaccuracy in conventional gyroscopes.

Industrial Security Award Winners Announced by Defense Supply Agency

Winners of the annual James S. Cogswell awards for superior performance in carrying out industrial security obligations relating to classified defense contracts have been announced by Vice Admiral Joseph M. Lyle, USN, Director of the Defense Supply Agency.

Two types of awards were made: plaques for outstanding performance and certificates for excellence. Eight plaques and eight certificates were awarded for four categories of defense contractors, classified according to the size of their industrial operations.

Plaques went to Grumman Aircraft Engineering Corp., Bethpage, N.Y.; Lockheed-Georgia Co., Marietta Ga.; TRW Systems, Redondo Beach, Calif.; Conductron Corp., Ann Arbor, Mich.; Denver Research Institute, University of Denver, Denver, Colo; Radiation, Inc., Palm Bay, Fla.; Autonetics Div., North American Aviation, Inc., Dayton, Ohio; and Smyth Research Associates, San Diego, Calif.

Certificates of excellence were presented to General Motors Defense Research Laboratory, Goleta, Calif.; Franklin Institute, Philadelphia, Pa.; Librascope Group of General Precision, Inc., Glendale, Calif.; Southern Bell Telephone and Telegraph Co., Atlanta, Ga.; Wasatch Division of Thiokol Chemical Corp., Brigham City, Utah; TRW, Inc., Cleveland, Ohio; Bliley Electric Co., Erie, Pa., and Systems Development Corp., Dayton, Ohio.

Some 15,000 industrial firms having DOD security clearances to perform on classified contracts were considered for the awards.

Factors in selecting the winners included: degree of security consciousness, security education and motivation programs, regular inspections by contractors of security practices within the organization, security review procedures in company publications and adaptation of new security methods in such areas as reproduction and transmission of documents, control of movement of employees and visitors within plants.

The award is named in honor of Colonel James S. Cogswell, USAF, (Ret.), first chief of a centralized office of industrial security established under the Deputy Director for Contract Administration Services of the Defense Supply Agency in January 1965.

OFFICE OF THE SECRETARY OF DEFENSE
WASHINGTON, D. C. 20301

OFFICIAL BUSINESS

POSTAGE AND FEES PAID

Defense Contract Administration Services Completes First Year of Full Operation

The first year of full operation of Defense Supply Agency's Defense Contract Administration Services (DCAS) saw an increase of 54 percent of prime contracts handled by the new organization. This workload was accomplished with an increase of less than 19 percent in personnel. Payments to contractors jumped from 90,000 paid invoices a month to more than 160,000 a month during the year.

Eleven regions across the country, beginning with Philadelphia as a pilot test region, were established on a time-phased basis by the end of 1965.

The establishment entailed consolidating 20,000 military and civilian employees, who previously performed field contracts administration under separate systems of the Army, Navy, Air Force and the Defense Supply Agency. About the same number of personnel are performing contract administration in the Military Departments.

DCAS provides contract management services in or near contractors' plants to the Military Departments and NASA to assure delivery of quality products to depots or battlefields on a timely basis. These include pre-award surveys of potential contractors to determine their capability to perform, quality assurance engineering assistance, surveillance of production progress, transportation, packaging management and prompt payments of invoices.

Payment of contractors was one of the major problems when each region took over the invoices from the individual services. Continual improvement was made during 1966 so that the time cycle for payment of invoices was reduced from an average of 18 days to 11 days. This was accomplished despite an 81 percent increase in number of invoices processed.

Before the organization of DCAS, 444 offices of Military Departments were administering defense contracts. DCAS consolidated 180 of these offices into 99, all operating under uniform policies and procedures. Now defense contractors can look to a single organization for all problems or questions that might arise on a contract being administered by DCAS regardless of whether the contract was awarded by the Army, Navy, Air Force, Defense Supply Agency, NASA, or any other Government agency.

Deferred Construction Projects Released

Secretary of Defense Rob S. McNamara has rescinded 1965 order deferring the aw of contracts for more than military construction projec including 8,250 family housi units, totaling $564 million.

The projects, located at 285 stallations in 42 states, the D trict of Columbia and 16 si outside the United States, we authorized in FY 1966 and p vious years.

In announcing the deferme on Dec. 21, 1965, Secretary M Namara stated that these pr ects, while considered necessa and desirable, could be temp rarily deferred without impai ing military operations or effe tiveness.

The go-ahead signal on t contracts was given to bene morale in the Armed Forces a to satisfy valid construction a housing requirements.

Prior to the rescinding orde a limited amount of the $620 mi lion of deferred projects were r leased as a result of deployme changes or other compelli reasons which increased the urgency. These projects whic were released between Decem ber 1965 and January 196 amounted to $33.8 million.

Some projects, amounting t abount $23 million, have bee dropped completely since the d ferment action.

DEFENSE INDUSTRY BULLETIN

Volume 3, No. 3 March 1967

C-9

DEPARTMENT OF DEFENSE

Publication of

ASSISTANT SECRETARY OF DEFENSE-PUBLIC AFFAIRS

IN THIS ISSUE

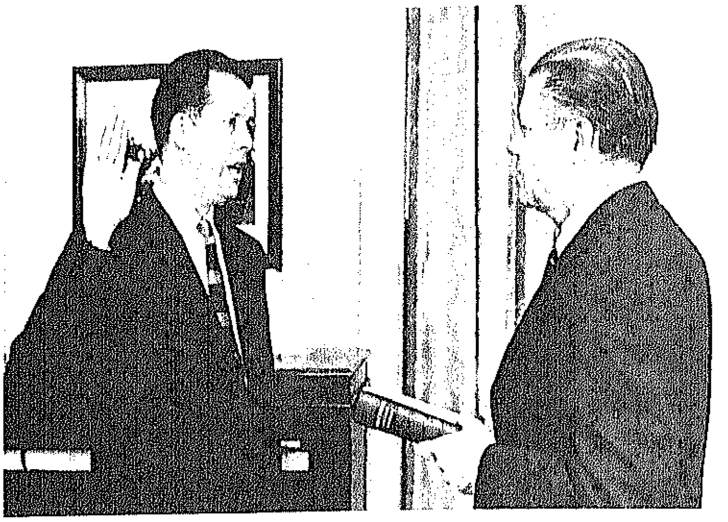
DEPARTMENTS

Loaded for Action

A U.S. Marine private, armed with an M-14 rifle and 3.5-inch rocket launcher, wades through a flooded rice field during search and destroy operations south of Da Nang, Vietnam.

(See statement on Fiscal Year 1967 Supplemental for Southeast Asia on page 1.)

Phil G. Goulding Sworn in as New Assistant Secretary of Defense (Public Affairs)



Secretary of Defense Robert S. McNamara administers the oath of office to the new Assistant Secretary of Defense for Public Affairs, Phil G. Goulding, during ceremonies at the Pentagon Feb. 28. Mr. Goulding has been serving as Deputy Assistant Secretary of Defense for Public Affairs for nearly two years. He was a member of the Washington bureau of the *Cleveland Plain Dealer* before entering Government service.

Study Group Formed To Examine Future Construction of Navy Escort Ships

The Navy has begun a study of ship design and construction to determine the optimum characteristics of the escort ships it will need in the 1970's and the means of producing them. At this point the ships are not yet in the design state but are known as the DX and DXG from the designations presently used for the destroyer, destroyer escort and frigate types.

A study group formed within the Office of the Chief of Naval Operations will examine missions and roles for the ships and will make specific recommendations concerning the capabilities which should be built into the new vessels and the number that should be built. Special emphasis will be placed on answering these problems before contract definition. Subject to the results of these studies, it is expected that private industry will be invited to make proposals for detailed design and construction of the ships.

The study will seek also to establish common standards among these ships in order to realize economies in production and to realize the benefits of modular construction in series production—building similar components in series rather than on an intermittent, variable design basis.

Rear Admiral Thomas R. Weschler, USN, has been assigned to the Office of Chief of Naval Operations as the DX/DXG Program Coordinator.

It is expected that, when a determination is made to enter a competitive contract definition phase for the DX/DXG, a classified briefing for industry will be held in Washington, D.C., early in the fiscal year beginning July 1, 1967.

DEFENSE INDUSTRY BULLETIN

Published by the Department of Defense

Hon. Robert S. McNamara
Secretary of Defense

Hon. Cyrus R. Vance
Deputy Secretary of Defense

Hon. Phil G. Goulding
Assistant Secretary of Defense (Public Affairs)

Col. Joel B. Stephens, USA
Director for Community Relations

Col. Edwin C. Gibson, USA
Chief, Business & Labor Division

Editor.......LCdr. E. W. Bradford, USN
Assoc. Editor.........Miss Cecilia Pollok
Assoc. Editor..........Mr. Rick La Falce
Editorial Assistant
Norman E. Worra, JO1, USN

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The purpose of the *Bulletin* is to serve as a means of communication between the Department of Defense (DOD) and its authorized agencies and defense contractors and other business interests. It will serve as a guide to industry concerning official policies, programs and projects, and will seek to stimulate thought by members of the defense-industry team in solving the problems that may arise in fulfilling the requirements of the DOD.

Material in the *Bulletin* is selected to supply pertinent unclassified data of interest to the business community. Suggestions from industry representatives for topics to be covered in future issues should be forwarded to the Business & Labor Division.

The *Bulletin* is distributed without charge each month to representatives of industry and to agencies of the Department of Defense, Army, Navy and Air Force. Requests for copies should be addressed to the Business & Labor Division, OASD(PA), Room 2E813, The Pentagon, Washington, D.C. 20301, telephone, (202) OXford 5-2709.

Fiscal Year 1967 Supplemental for Southeast Asia

[Editor's note: The following is the statement of Secretary of Defense Robert S. McNamara before a joint session of the Senate Armed Services Committee and the Senate Subcommittee on Department of Defense Appropriations on the FY 1967 Supplemental for Southeast Asia on Jan. 23, 1967. Space limitations do not permit carrying the entire statement. We have, however, attempted to excerpt those portions which are of special interest to industry.]

Last year when I appeared before this Committee in support of the FY 1967–71 program and the FY 1967 Budget I said:

> "With regard to the preparation of the FY 1967–71 program and the FY 1966 Supplemental and the FY 1967 Budget, we have had to make a somewhat arbitrary assumption regarding the duration of the conflict in Southeast Asia. Since we have no way of knowing how long it will actually last, or how it will evolve, we have budgeted for combat operations through the end of June 1967. This means that if it appears that the conflict will continue beyond that date, or if it should expand beyond the level assumed in our present plans, we will come back to the Congress with an additional FY 1967 request."

Throughout the spring and summer of last year in my appearances before the various Congressional Committees, I reiterated the fact that the FY 1967 Budget was based on the arbitrary assumption that the conflict would end by June 1967, and that additional funds would be required if the conflict continued. I also repeatedly stated, both before the Congressional Committees and in public statements, that defense spending would rise above the Budget level if we had to take actions to provide for the continuation of the conflict beyond June 30, 1967. . . .

Inasmuch as I will soon appear before this Committee again in support of the FY 1968–72 Program and the FY 1968 Budget, I would like to confine my statement at this time to the military situation in Southeast Asia and the additional financial requirements for the balance of the current fiscal year arising from that conflict.

Policy Objectives and Military Tasks in Vietnam.

In formulating our military objectives and operational plans for Vietnam, we must take into account the unique character of that conflict. Since what we are facing is a systematic campaign of terror and subversion, supported and directed from without, there are no established lines across which armies face armies, with each side having well defined contiguous areas under its control. Instead, the territory and people in South Vietnam are controlled in varying degrees by the government and by the Viet Cong.[a] Some areas are firmly under the control of the government, some under the control of the Viet Cong, and still other areas are controlled by neither side. This requires that our military efforts in South Vietnam consist of widely dispersed military operations directed at the scattered and changing areas of Viet Cong control.

Our overall policy objective in South Vietnam is a stable and independent government free of external control and externally inspired and supported violence. Our immediate objective is to influence the North Vietnamese to move the conflict from the battlefield to the conference table, or to compel them to desist in their aggression. The basic tasks which flow from these objectives are:

- To support the re-establishment of the authority of the government of South Vietnam over its territory.
- To interdict the flow of men and supplies from North Vietnam to South Vietnam.
- To exert pressure on the government of North Vietnam to cease its direction and support of the insurrection in South Vietnam.

Last year, I outlined for you the concept of military operations which had been developed to carry out these tasks. The ground forces, United States, Korean, Australian, New Zealand, together with the South Vietnamese, were to conduct four major types of operations in South Vietnam which broadly overlapped with one another:

- "Search and destroy" operations, designed to destroy Viet Cong forces and their base areas (supplies, communications and installations). These operations were not intended to seize and hold territory permanently.
- "Clear and secure" operations to eliminate, permanently, residual Viet Cong forces from specified limited areas. These operations were designed to hold territory and were to be undertaken only when it was considered possible to conduct, on a continuing basis, the full range of pacification measures required to secure the area.
- "Reserve reaction" operations, designed to relieve provincial capitals and district towns under Viet Cong attack and to reinforce friendly forces when needed.
- Defense of government centers, including the protection of provincial capitals, district towns, key governmental facilities and installations.

The ground combat units of the regular South Vietnamese forces, together with U. S. and other Free World forces, (i.e., Korean and Australian/New Zealand) were to concentrate on the first type of operation. The South Vietnamese forces, with some assistance from U. S. and other Free World forces, particularly in areas contiguous to their own bases, were to assume primary responsibility for the second type of operations. The third type was to be primarily the responsibility of the South Vietnamese forces with such help as might be required from U. S. and other Free World forces. The fourth type was to be essentially the responsibility of the South Vietnamese forces. . . .

U.S. Forces in Southeast Asia.

At the close of 1966, we had a total of about 383,000 men in South Vietnam, 35,000 in Thailand and 36,000 Navy forces aboard ship off the coast of Vietnam. The number in South Vietnam will continue to increase during the next year and a half, athough at a very much slower rate than during the preceding year and a half. Rising inflation within the Vietnamese economy accompanied the U.S. buildup, and piaster expenditure limitations as well as military requirements had to be considered when establishing these force levels. However, our deployment plans beyond December 1967 are still tenta-

[a] *Throughout this statement the term "Viet Cong" will be used to refer to the forces of the National Liberation Front and of North Vietnam.*

tive; the number actually deployed will depend on how the situation evolves over the next 12 months. In this connection, it should be noted that we will have five Army and two Marine Corps division forces in our active central reserve, plus nine in the inactive reserve during this period; and additional aircraft squadrons could also be deployed, if needed.

Most of these maneuver battalions in South Vietnam are infantry, airmobile, or airborne; the terrain there does not lend itself to the extensive employment of mechanized and armored units. The distinction among the infantry, airmobile and airborne battalions is more in form than in substance; all three are used in about the same way. Although the nine battalions of the 1st Cavalry Division (Airmobile) have their own helicopters, the infantry and airborne, as well as the Marine Corps battalions, are provided helicopter support as required. Indeed our land forces were supported by about 2,000 Army and Marine Corps helicopters at the end of 1966, and this number will be increased very substantially over the next 12 months. (The Army and Marine Corps units will also be supported by several hundred observation and utility fixed-wing aircraft.)

The extensive employment of helicopters, both for lift and for the suppression of ground fire in the landing zones, is one of the unique aspects of our combat operations in South Vietnam. It has provided our ground forces with an extraordinary degree of mobility and a very effective source of firepower during the critical landing phase. Helicopter losses of 340 in 1966 actually ran considerably below the number projected a year ago. However, we are providing for substantially higher losses in the FY 1967 Supplemental and the FY 1968 Budget because of the much larger number of helicopters expected to be in operation during the period.

Another unique aspect of our ground effort in Vietnam, particularly in view of the absence of an established "front," is the extensive use of artillery. We already have a large number of artillery battalions in South Vietnam and this number will grow substantially within the next 12 months. The 105mm howitzer has proved to be particularly useful in Vietnam since it can be lifted by helicopter and can, in many cases, be used to support patrols on the ground. Together with the large number of mortars provided our forces in South Vietnam, the extensive use of artillery gives them a highly efficient form of close support which has been a decisive factor in many of the battles fought during the last 12 months. . . .

U.S. and other Free World forces in South Vietnam during the September-November 1966 period consumed, on the average, about one million artillery rounds and about 0.7 million mortar rounds per month. We have provided in our FY 1967 Supplemental and the regular FY 1968 Budget for considerably higher consumption rates and the peak monthly production rates will be still higher.

After we have rebuilt our inventories, the production rates will be reduced to the projected consumption levels and held at those levels for as long as may be necessary. Indeed, if the consumption rates should exceed the planned levels, production can be continued at the higher rates. Conversely, if consumption should fall short of our projections, production plans will be adjusted accordingly.

With regard to small arms ammunition, the Free World forces in Vietnam during the September-November 1966 period consumed, on the average, about 100 million rounds per month. We have provided in our Budget for much higher consumption and production rates.

To provide close air support for the ground forces in South Vietnam, interdict the Viet Cong's lines of communication from North Vietnam and attack targets in North Vietnam, we have now deployed a total of about 1,000 fighter and attack aircraft to Southeast Asia, including those on carriers off the coast of Vietnam. This force will be maintained at essentially the same level. . . .

Fighter and attack aircraft losses in calendar year 1966 ran slightly below those projected a year ago, about 500 compared with 524 estimated. We have provided in the FY 1967 Supplemental and the FY 1968 Budget for losses through the entire production lead time, December 1969.

Air ordnance consumption by these forces, including the B-52, the U.S. Army and Marine Corps helicopters and the South Vietnam Air Force, totaled about 56,000 tons in December 1966. The production program reflected in the FY 1967 Supplemental and the FY 1968 Budget will provide for a rate of consumption almost equal to the total air ordnance consumed by U.S. forces in the peak year of World War II in Europe, and almost four times the consumption in the peak of the Korean War. As long as combat operations continue, production rates will be tailored to actual consumption. Following termination of hostilities, production will continue until inventories are built to levels required for a "cold-line" production base. Air ordnance stocks "in-theater" are equivalent to about three and a half months of consumption at current rates.

The U.S. Navy Southeast Asia "off-shore" fleet will be maintained at about the current level, i.e., some 90 ships. In addition to the fighter and attack aircraft operating from the three attack carriers which are in combat at any one time, this fleet also provides assault ships for amphibious operations, radar picket destroyers and minesweepers for the Coastal Patrol, seaborne hospital facilities, and fire support for the land forces. During the last half of 1966 about 36,000 round per month of naval gun ammunition (excluding 40mm) were expended. We have provided in our budget for a higher consumption rate.

In addition to the radar picket destroyers and minesweepers, the Coastal Patrol also includes 26 Coast Guard boats and 84 Swift boats engaged in what we call "Market Time" operations. These operations have been quite effective and we believe that very few supplies are reaching the Viet Cong forces by sea. We do believe, however, that a substantial increase in the river control force is required. We now have 120 water jet boats and a number of support ships assigned to this effort, and this force will be substantially increased over the next several months. . . .

To help move the vastly increased cargo to South Vietnam, we have activated about 151 ships from the National Defense Reserve Fleet through December 1966, and the 10 scheduled for activation in the month of January would make a total of 161 activated since June 30, 1965. Together with 11 Government-owned ships already in operation, this will make a total of 172 Government-owned merchant ships available. Along with the ships furnished by the privately-owned fleet, our military sealift operations will amount to

about 25 million measurement tons per year, about 14 million tons to Southeast Asia and the Western Pacific and about 11 million tons to all other areas.

MSTS troop transports will continue to be used for the movement of troop units to and from Vietnam but individual replacement personnel will move by air. The Military Airlift Command (including commercial augmentation) is now flying about 25,000 short tons of cargo and 35,000 passengers into Southeast Asia per month. In addition, the Air Force is operating a substantial tactical airlift force in Southeast Asia and the Western Pacific, a total of 23 squadrons and 368 aircraft. . . .

Additional U.S. Force Augmentations.

To support the larger deployments and higher activity rates in Southeast Asia and to provide a more adequate training and rotation base for the longer pull, we have had to increase certain force levels above those reflected in the original FY 1967 Budget. A total of 220,500 military personnel have been added to the Army's FY 1967 end strength, 2,440 to the Marine Corps, 25,520 to the Navy, and 45,240 to the Air Force.

Shown on Table 1 (Supplemental tables begin on page 5) is a recapitulation of the military and civilian personnel strengths as provided in the FY 1967 Budget and, as estimated in the revised FY 1967 Budget, together with the net increase requested in the FY 1967 Supplemental. You will notice we entered the fiscal year with about 104,000 more military personnel than we had originally planned; and we expect to end the year with about 294,000 more. In terms of man-years (i.e., average strength), we expect to have a total of about 236,000 more than provided for in the original FY 1967 Budget; the funds for these additional personnel are included in the Supplemental. . . .

Additional FY 1967 Financial Requirements.

Table 2 provides a summary of the additional funds required by the Defense Department for the balance of FY 1967. The first column, "NOA Enacted," totaling $59,940 million, reflects the amounts enacted by the Congress thus far this fiscal year. The second column, "Transfers and Adjustments," summarizes a large number of mostly small offsetting transactions among the various appropriation accounts. . . .

The third column, "Military and Civilian Pay Supplemental," totaling about $519 million, shows the amounts required to defray the pay increases voted by the Congress last year. The fourth column, "Medicare and Homeowners Assistance Supplemental," totaling $82 million, includes two items: $71 million to help finance the cost of the Military Medical Benefits Amendments Act of 1966 and $11 million to initiate the Homeowners Assistance Program which was authorized by the Demonstration Cities and Metropolitan Development Act of 1966. . . .

The fifth column, "SEA Supplemental," totaling $12,276 million, includes the additional amounts required for the support of our military effort in Southeast Asia during the balance of FY 1967. This is the Supplemental now before the Committee.

Including all the Supplementals and adjustments, total NOA for FY 1967 will amount to about $72,816 million, compared with $59,940 million originally enacted—an increase of $12,875 million.

As shown at the bottom of Table 2, expenditures in FY 1967 are now estimated at $67,950 million, compared with $58,300 million estimated in the original FY 1967 Budget, an increase of $9,650 million. . . .

Procurement.

Included in the Southeast Asia Supplemental is a total of $6,306 million for procurement. In discussing the content of this procurement program, I shall refer to the net change between the original program as set forth in the FY 1967 Budget and the current program, rather than to the details as set in the Supplemental itself. This approach will give you a clearer picture of the revised program. The reason is that during the year, it has been necessary to finance procurement of certain urgently needed Southeast Asia items by transferring funds originally programmed for other purposes. Certain procurement items in the Supplemental bill reflect the restoration of these transferred funds. The total revisions to the procurement program are therefore the net effect of both reprogrammings and the Supplemental. The separate amounts for each of these is shown in the detailed tables I shall refer to shortly. Table 3 gives a summary of the net change in the major procurement categories. You will notice the two major categories are ammunition and aircraft, accounting between them for about $4.4 billion of the total increase in procurement.

Ammunition.

For ammunition, we are requesting a net addition of $677 million, of which 60 percent is for ground munitions and the rest is for air munitions. This Supplemental amount will bring the total for ammunition in FY 1967 to about $4.6 billion, about $600 million more than FY 1966.

In the air munitions category, two of the principal items being increased are 500-lb. bombs and 750-lb. bombs, both of which are carried by the B-52's. We have also included funds for additional air-to-surface antiradiation missiles. Peak production is scheduled to be reached by April. Depending upon actual consumption trends, we now plan to taper off production later this year. However, we have included about $110 million in the Supplemental for advance procurement of long lead time air munitions components in order to retain a capability to increase production to within 10 percent of the April peak in a period of four to six months, if needed. And, we have production capacity in place for even high rates.

With regard to ground munitions, peak production for the 40 major items, accounting for about 85 percent of the tonnage used in Vietnam, will be reached by October of this year. We also have the capability, with a decision lead time of about six months, to raise the production base for ground munitions by an additional 30 percent, if that should ever become desirable. Production is now increasing rapidly, and by July of this year should be close to planned peak rates.

The largest single item of ground ammunition added to the FY 1967 program is $250 million for 105mm artillery ammunition of all types. As I indicated earlier, this weapon is used very extensively throughout Vietnam for a great variety of purposes. Other major items are the 5.56mm cartridge, 60mm mortar rounds and 155mm projectiles.

For ship gun ammunition, a net amount of about $73 million has been added to the original FY 1967 program, offset by decreases in other types of ship-launched munitions. As I noted earlier, our Fleet off the

coast of Vietnam is expending about 36,000 rounds per month of naval gun ammunition (excluding 40mm). This consumption must now be replaced.

Aircraft.

Of the $3,715 million added to the FY 1967 program for aircraft, about $1,525 million is for the replacement of future combat losses. Included for the Navy and the Marine Corps are F–4's, A–4's, A–6A's and UH–1E's, a total of 431 aircraft. For the Air Force (including the South Vietnamese Air Force) we have added F–4's, F–5's and A–37's, a total of 175 aircraft. The apparent imbalance between the Navy and the Air Force add-ons simply reflects the fact that a large number of aircraft were provided for the Air Force in the FY 1966 program. Furthermore, another large quantity of tactical fighter and attack aircraft are provided for the Air Force in the FY 1968 program. For the Army, the major addition for attrition consists of UH–1's.

We have also added large numbers of aircraft for training, for example, 582 helicopters for the Army and 174 fixed-wing aircraft for the Air Force. With regard to the Navy and Marine Corps, we have rearranged the trainer aircraft program by adding 50 TA–4F's, 36 T–2B's, and 9 TC–4C's, and deleting 58 T–28's and 20 TH–1E's.

A sizable number of AH–1G's (armed UH–1's) were added for the equipping of new Army aviation units; and an additional quantity of AH–1G was substituted for an equal number of UH–1's included in the original program. Other additions to the procurement program stem from force changes related to Southeast Asia needs. For example, in order to augment the Tactical Air Control Forces and the Special Air Warfare Forces, 176 0–2A's are being added to the Air Force's FY 1967 procurement program. In total, some $440 million has been added to the FY 1967 Budget for these purposes.

In summary, the net increase for the Army is 936 aircraft, the Navy and Marine Corps 427, and the Air Force 425—for a total of 1,788.

Almost $1 billion has been added to the FY 1967 Budget for additional aircraft spares. The original FY 1967 program provides for spares consumption only through June 1967; we are now requesting funds to finance the full production lead time, which in many cases extends through December 1968. Other aircraft equipment, both ground and airborne, accounts for about $755 million of the increase in the FY 1967 Budget.

The net increase of $1,927 million for vehicles, electronics and communications and other equipment is to provide both for the replacement of equipment to be attrited in Southeast Asia in the future and for the equipping of new units.

Research, Development, Test and Evaluation (RDT&E).

The additional amounts required for RDT&E are shown on Table 2. While support of limited war requirements has for years been an essential part of our research and development program, in order to ensure that the research and development program would be fully responsive to the needs of the forces in Southeast Asia, Project PROVOST (Priority Research and Development Objectives for Vietnam Operations) was established in late 1965. PROVOST is designed to identify those programs or projects which have significant potential for near term application to the Vietnam conflict so that they may be accorded the necessary priority. By their very nature, these requirements cannot be foreseen and to the extent that additional funds are needed, they must be obtained by reprogramming, by use of emergency funds, or by new appropriations. . . .

During FY 1967, we have continued, wherever possible, to reprogram or draw on the Emergency Fund. However, almost all of the FY 1967 Emergency Funds have now been used and there remain a number of urgent projects for which there is no foreseeable source of financing other than new appropriations. Accordingly, we have included $135 million in the FY 1967 Supplemental for this purpose. Broadly speaking, the additional projects to be financed in FY 1967 fall into three categories. Efforts in the first category are concerned with improving the ability of our forces to fight at night, efforts in the second category, with reducing aircraft combat losses, and efforts in the third category, with the development of counter-infiltration systems and weapons.

Military Construction.

The FY 1967 Supplemental includes $625 million for Military Construction; $398 million for projec in South Vietnam, $109 million i Thailand, $32 million in other Pacif areas, $75 million in the Unit States and $10 million for plannin Of the $398 million for South Vie nam, $126 million is required t cover cost overruns on previously ap proved projects originally estimate to cost $868 million. Since $77 millio from the DOD FY 1966 militar construction contingency fund has a ready been applied to these project the total cost overrun would be $20 million, or 23 percent of the origina estimate. Another $88 million is fo personnel facilities, $49 million fo airfields, $29 million for utilities, $1 million for harbor dredging, $10 mil lion for facilities related to the re location of U.S. personnel from Sai gon and $81 million for a larg number of other operational, suppl and support facilities.

The $109 million requested fo Thailand includes $10 million for cos overruns on previously approve projects (i.e., five percent of th original estimate), $10 million fo port facilities, $19 million for road from the Port of Sattahip to variou military installations in Thailand, $1 million for utilities, $7 million fo personnel facilities and $53 millio for other operations, supply an support facilities.

The $32 million requested for othe Pacific areas includes $5.4 million fo ship repair facilities, $9 million fo airfield facilities (including a cos overrun of $3 million for previously approved projects in Taiwan), $3 million for POL storage, $2.3 million for hospital improvements (primarily air conditioning in Japan) and $12 million for maintenance, communications utilities and other support facilities.

The $75 million requested for projects in the United States includes $51 million for training facilities (Navy aviation, Army and Marine helicopter training, and Seabee training), $5 million for Military Airlift Command facilities, $7.3 million for personnel facilities (primarily Marine Corps), and the balance for a large number of relatively small facility improvements throughout the country. . . .

Additional Authorizations.

The additional amounts requested to be authorized for aircraft, missiles, naval vessels, tracked combat vehicles and RDT&E are shown in Tables 4, 5 and 6.

Table 1

Recapitulation of Military and Civilian Personnel Strength

FY 1967

	Original FY 1967 Budget			Revised FY 1967 Budget			Change		
	Begin	End	Average	Begin	End	Average	Begin	End	Average
Active Duty Military Personnel									
Army	1,159,043	1,233,693	1,206,574	1,199,046	1,454,200	1,368,233	+ 40,003	+220,507	+161,659
Navy	723,723	727,873	724,151	744,469	753,394	748,938	+ 20,746	+ 25,521	+ 24,787
Marine Corps	250,079	278,184	272,596	261,687	280,624	277,545	+ 11,608	+ 2,440	+ 4,949
Air Force	854,498	853,359	855,419	886,350	898,600	900,136	+ 31,852	+ 45,241	+ 44,717
Total	2,987,343	3,093,109	3,058,740	3,091,552	3,386,818	3,294,852	+104,209	+293,709	+236,112
Direct Hire Civilian Personnel									
Army	359,632	357,923	360,066	371,121	426,164	393,998	+ 11,489	+ 68,241	+ 33,932
Navy (including USMC)	357,601	362,893	359,394	356,744	398,608	381,189	− 857	+ 35,715	+ 21,795
Air Force	301,378	308,717	308,986	306,911	319,462	319,349	+ 5,533	+ 10,745	+ 10,363
Defense Agencies	68,505	63,848	63,561	68,923	72,361	71,256	+ 418	+ 8,513	+ 7,695
Total	1,087,116	1,093,381	1,092,007	1,103,699	1,216,595	1,165,792	+ 16,583	+123,214	+ 73,785

Table 2

Financial Summary of FY 1967 Budget Including the Proposed Supplemental for Southeast Asia

(In Thousands of Dollars)

	NOA Enacted (1)	Transfers and Adjustments (2)	Military and Civilian Pay Supplemental (3)	"Medicare" and "Homeowners Assistance" Supplemental (4)	S.E.A. Supplemental (5)	Total NOA (6)
MILITARY PERSONNEL						
Military Personnel, Army	6,164,400	4,164	78,500	--	650,500	6,897,564
Military Personnel, Navy	3,652,100	−4,164	77,700	--	220,800	3,946,436
Military Personnel, M.C.	1,183,200	--	24,300	--	58,400	1,265,900
Military Personnel, A.F.	5,015,800	--	106,300	--	403,700	5,525,800
Reserve Personnel, Army	288,211	--	6,200	--	14,900	309,311
Reserve Personnel, Navy	112,600	--	800	--	--	113,400
Reserve Personnel, M.C.	36,500	--	800	--	--	37,300
Reserve Personnel, A.F.	69,700	--	1,100	--	--	70,800
Nat'l Guard Personnel, Army	346,533	--	8,520	--	15,280	370,333
Nat'l Guard Personnel, A.F.	82,000	--	1,910	--	290	84,200
Retired Pay, Defense	1,780,000	--	34,000	--	--	1,814,000
TOTAL—Military Personnel	18,731,044	--	340,130	--	1,363,870	20,435,044
OPERATION AND MAINTENANCE						
Oper. & Maint., Army	5,122,427	33,005	64,000	29,000	1,968,000	7,216,432
Oper. & Maint., Navy	3,980,300	−24,806	42,000	25,000	624,000	4,646,494
Oper. & Maint., M.C.	325,600	−48	2,300	--	96,700	424,552
Oper. & Maint., A.F.	4,943,100	−1,823	49,000	17,000	528,000	5,535,277
Oper. & Maint., Def. Agcs.	806,500	2,517	20,300	--	85,800	915,117
O&M, Army Nat'l Guard	231,000	--	--	--	--	231,000
O&M, Air Nat'l Guard	253,300	--	1,400	--	--	254,700
Nat'l Bd for Prom. R.P., Army	494	--	--	--	--	494
Claims, Defense	25,000	--	--	--	9,000	34,000
Contingencies, Defense	15,000	--	--	--	--	15,000
Ct of Mil Appeals, Defense	600	--	--	--	--	600
TOTAL—Oper. & Maint.	15,703,321	8,844	179,000	71,000	3,311,500	19,273,665
PROCUREMENT						
Proc. of Equip. & Msls, Army	3,483,300	--	--	--	2,130,000	5,613,300
Proc. of A/C & Msls, Navy	1,789,900	−58,000	--	--	1,752,000	3,483,900
Shipbldg. & Conv., Navy	1,756,700	--	--	--	--	1,756,700
Other Procurement, Navy	1,968,300	--	--	--	287,000	2,255,300

Continued on page 18

Financial Summary of FY 1967 Budget Including the Proposed Supplemental for Southeast Asia

(In Thousands of Dollars)

	NOA Enacted (1)	Transfers and Adjustments (2)	Military and Civilian Pay Supplemental (3)	"Medicare" and "Homeowners Assistance" Supplemental (4)	S.E.A. Supplemental (5)	Total NOA (6)
Procurement, M.C.	262,900	--	--	--	253,000	515,900
A/C Proc., Air Force	4,017,300	−4,000	--	--	1,303,000	5,316,300
Missile Proc., Air Force	1,189,500	--	--	--	45,000	1,234,500
Other Proc., Air Force	2,122,600	--	--	--	536,000	2,658,600
Proc., Defense Agencies	51,300	--	--	--	--	51,300
TOTAL—Procurement	16,641,800	−62,000	--	--	6,306,000	22,885,800
RES., DEV., TEST, & EVAL.						
RDT&E, Army	1,528,700	27,998	--	--	40,000	1,596,698
RDT&E, Navy	1,758,600	115,436	--	--	40,000	1,914,036
RDT&E, Air Force	3,112,600	23,151	--	--	33,000	3,168,751
RDT&E, Defense Agencies	459,059	1,781	--	--	22,000	482,840
Emergency Fund, Defense	125,000	−106,805	--	--	--	18,195
TOTAL—RDT&E	6,983,959	61,561	--	--	135,000	7,180,520
MILITARY CONSTRUCTION						
Military Constr., Army	114,014	--	--	--	288,500	402,614
Military Constr., Navy	126,918	--	--	--	140,000	266,918
Military Constr., A.F.	205,495	--	--	--	196,000	401,495
Military Constr., Def. Agcs.	7,547	440	--	--	--	7,986
Military Constr., Army Res.	--	--	--	--	--	
Military Constr., Naval Res.	5,400	--	--	--	--	5,400
Military Constr., A.F. Res.	3,600	--	--	--	--	3,600
Military Constr., Army N.G.	--	--	--	--	--	
Military Constr., Air N.G.	9,400	--	--	--	--	9,400
Loran Stations, Defense	--	--	--	--	--	
TOTAL—Military Constr.	472,374	440	--	--	624,500	1,097,314
FAMILY HOUSING						
Family Housing, Defense	507,196	--	--	--	--	507,196
Homeowners Assistance, Defense	--	--	--	11,000	--	11,000
CIVIL DEFENSE						
O&M, Civil Defense	66,100	−1	--	--	--	66,099
Resch., Shltr. Surv. & Mark., C.D.	35,000	--	--	--	--	35,000
Constr. of Facilities, C.D.	--	--	--	--	--	
TOTAL—Civil Defense	101,100	−1	--	--	--	101,099
SPECIAL FOREIGN CURRENCY PROGRAM	7,348	--	--	--	--	7,348
REVOLVING FUNDS						
Army Stock Fund	--	--	--	--	351,000	351,000
Navy Stock Fund	--	--	--	--	77,000	77,000
Defense Stock Fund	--	--	--	--	107,000	107,000
TOTAL—Revolving Funds	--	--	--	--	535,000	535,000
DEPARTMENT OF DEFENSE TOTALS						
of the Army	17,279,079	65,167	157,220	29,000	5,458,180	22,988,646
Navy	16,959,018	28,418	147,900	25,000	3,548,900	20,709,236
Air Force	21,024,395	17,328	159,710	17,000	3,044,990	24,263,423
	3,784,550	−102,069	54,300	11,000	223,800	3,971,581
	101,100	−1	--	--	--	101,099
y Functions	59,148,142	8,842	519,130	82,000	12,275,870	72,033,984
	792,000	−10,425	--	--	--	781,575
DOD	59,940,142	−1,583	519,130	82,000	12,275,870	72,815,559
DITURES—DOD	58,300,000	--	505,000	61,000	9,084,000	67,050,000

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Table 3

Net Additions to the FY 1967 Procurement Program for Southeast Asia

($ millions)

	Army	Navy and Marine Corps	Air Force	Total
Ammunition	309	89	279	677
Aircraft				
Combat Attrition	14	1073	438	1525
Training and Other	258	135	46	439
Spares	149	314	533	996
Other A/C Equipment	169	329	257	755
Total Aircraft	590	1851	1274	3715
Vehicles	288	167	51	506
Electronics and Communications	326	102	141	569
Other	619	131	110	852*
Net Change in Program (TOA)	2130	2340	1855	6317*
Financing Adjustments	--	−48	+29	−11*
FY 1967 Supplemental (NOA)	2130	2292	1884	6306

* Reflects $8 million reduction in Procurement, Defense Agencies program.
Note: Detail may not add to totals due to rounding.

Table 4

Amounts Requested for Aircraft, Missiles, Ships and Tracked Combat Vehicle Procurement Authorization in FY 1967 Supplemental Request

($ In thousands)

	Authorized FY 1967	Appropriated FY 1967	Supplemental (NOA) FY 1967
Aircraft			
Army	612,400	612,400	533,100
Navy and Marine Corps	1,434,200	1,422,200	1,703,300
Air Force	4,041,300	4,017,300	1,303,000
Missiles			
Army	510,000	510,000	6,100
Navy	367,700	367,700	48,700
Marine Corps	17,700	17,700	2,100
Air Force	1,189,500	1,189,500	45,000
Naval Vessels			
Navy	1,901,800	1,756,700	--
Tracked Combat Vehicles			
Army	359,200	359,200	62,200
Marine Corps	3,700	3,700	4,200
Totals	10,437,500	10,256,400	3,707,700

Table 5

Source of Funds for Aircraft, Missiles, Ships and Tracked Combat Vehicles FY 1967 Supplemental Procurement Program

($ In thousands)

	Total FY 1967 Program	Funding Available for Financing Program in Part	NOA Requested for Authorization
Aircraft			
Procurement of Equipment and Missiles, Army	1,202,100	669,000	533,100
Procurement of Aircraft and Missiles, Navy (and Marine Corps)	3,462,800	1,759,500	1,703,300
Aircraft Procurement, Air Force	5,685,400	4,382,400	1,303,000
Sub-Total—Aircraft	10,350,300	6,810,900	3,539,400
Missiles			
Procurement of Equipment and Missiles, Army	560,500	554,400	6,100
Procurement of Aircraft and Missiles, Navy	323,300	274,600	48,700
Procurement, Marine Corps	31,100	29,000	2,100
Missile Procurement, Air Force	1,284,500	1,239,500	45,000
Sub-Total—Missiles	2,199,400	2,097,500	101,900
Naval Vessels			
Shipbuilding and Conversion, Navy	2,041,000	2,041,000	---
Tracked Combat Vehicles			
Procurement of Equipment and Missiles, Army	508,900	446,700	62,200
Procurement, Marine Corps	18,400	14,200	4,200
Sub-Total—Tracked Combat Vehicles	527,300	460,900	66,400
GRAND TOTAL	15,118,000	11,410,300	3,707,700

Table 6

Amounts Requested for RDT&E Authorization in FY 1967 Supplemental Request

($ In thousands)

RESEARCH, DEVELOPMENT, TEST, AND EVALUATION	Authorized FY 1967	Appropriated FY 1967	Supplemental (NOA) FY 1967
Army	$1,539,500	$1,528,700	$ 40,000
Navy (including the Marine Corps)	1,801,100	1,758,600	40,000
Air Force	3,118,600	3,112,600	33,000
Defense Agencies	459,059	459,059	22,000
Emergency Fund	125,000	125,000	0
Total	$7,043,259	$6,983,959	$135,000

Desert Bonanza

by

Col. I. R. Perkin

Bonanza is a word calculated to stir the imagination. Coined in early gold rush days to connote unusually rich ore strikes, it is now a colloquialism for any source of wealth or high profit. In this sense, the Defense Department enjoys a real bonanza in the Military Aircraft Storage and Disposition Center (MASDC).

Situated in the heart of the copper mining region of the Southwest, where, symbolically enough, many an actual bonanza was struck, this airpower arsenal is daily yielding a rich harvest of aircraft and parts. Currently, over 4,000 used aircraft are stored in its vast, sprawling, desert warehouse—a 3,000-acre warehouse without a roof—located near Tucson, Ariz. Originally conceived in 1946 as a minimum-cost outdoor storage depot for surplus World War II bombers and fighters, it has since grown in size and scope and developed sufficient commonality of functions to warrant merging of similar Navy and Army operations.

To achieve such consolidation, DOD in 1964 elected to close Litchfield Naval Air Station, performing like Navy work near Phoenix, Ariz., and to centralize activities at one place. This action, initially scheduled for completion by July 1967, is proceeding ahead of schedule. As a consequence, and with the recent addition of Army workloads, DOD now centrally manages the storage, distribution and reclamation of all its excess military aircraft at Davis-Monthan AFB, Ariz.

The Department of the Air Force is designated single manager; the Air Force Logistics Command (AFLC) is charged as executive agent; and actual operations are carried out by MASDC, a field agency of AFLC.

A unique, one-of-its-kind organization, MASDC's mission might best be described as "aeronautical geriatrics"—the care and maintenance of elderly aircraft. These oldsters have frequently demonstrated a healthy emergency capability to either return to active service or contribute "bits and pieces" or parts to keep other aircraft flying. MASDC's real payoff to DOD lies in its expertise in handling the over 51 different types, models and series of these stored, aging veterans.

An expertise which, considering the value of hardware and aircraft returned to the active inventory from desert storage in the past five years, contributed to an impressive savings of $42 for every operational dollar spent. In terms of airpower support, the value of the center and its know-how is almost beyond measure. Time and again, in Korea, in Vietnam in massive foreign aid programs, it has paid off by providing a priceless reserve to meet unforeseen needs.

"How do you equate five-to-seven-year lead times," asked a Pentagon visitor, "with this on-the-shelf stockpile?"

The visitor, an Army man, was seeking aircraft to meet urgent, high-priority requirements—a practice which is becoming increasingly common with the U.S. Army Aviation Materiel Command (USAAVCOM). Located in St. Louis and commanded by Brigadier General H. F. Schiltz, this agency, a field activity of the Army Materiel Command, is the focal point for administration of the Army's reclamation and disposal program.

Col. Irving R. Perkin, USAF, is the Commander of The Military Aircraft Storage and Disposition Center, Davis-Monthan AFB, Ariz. His previous assignments were Dir. of Maintenance Engineering at the Middletown and Oklahoma City Air Materiel Areas; and Dir. of Flight Facilities, Europe, Africa and Middle East. He is a graduate of the U. S. Military Academy and received a Master of Business Administration degree from the University of Chicago.

It specifically looks to MASDC for aircraft operations involving:

- Receiving, processing and maintenance in storage.
- Removal from storage and preparation for shipment or flyaway.
- Removal of parts or components for inventory replenishment (reclamation) and disposition (sale or transfer of residue).

Since the start of Army support in August 1965, a considerable number of Army aircraft (mostly helicopters) have been processed by MASDC. Significantly, of the approximately million-dollar yield resulting from the first Army reclamation program (44 H–21's), almost half of the materiel recovered went to meet Air Force and Navy inventory requirements.

The Army also acquired 40 stored Navy and Air Force airplanes by transfer—all were prepared for "flyaway" by MASDC personnel.

While present Army support is small and constitutes less than four percent of MASDC's overall workload, the steadily increasing active inventory of Army aircraft presages a heavy future impact on desert storage.

Of the 4,000 aircraft in MASDC's care today, almost 900 belong to the Navy and Marines. The Naval Air Systems Command has overall program jurisdiction over these. Administration is accomplished through the Naval Air Systems Command Representative, Pacific (NAVAIRSYSCOMREP), located in San Diego and headed by Rear Admiral P. A. Holmberg. Additionally, the Navy maintains a Field Service Office at Davis-Monthan AFB.

Transition of the workload from Litchfield Park is virtually complete and Navy support now constitutes some 26 percent of MASDC's total effort. Generally, the merger has gone exceptionally well but for one technical area involving preservation techniques. Faced with severe salt water and salt air corrosion, the Navy has, understandably, developed different preservation methodologies from the Air Force.

Since DOD consolidation directives include a charge to standardize the preservation methodology, and since the state of the art of preservation

technology is anything but firm, a field test was decided upon. Complete cocooning has long since been ruled out for long-time storage as impractical, expensive and inefficient—it traps moisture within the airframe which, in turn, induces corrosion.

To determine optimum techniques, Operation Cabbage Patch, a controlled environmental testing program, was begun in October 1965. Controlled by a joint Air Force-Navy team of qualified engineers, a number of representative aircraft are now undergoing extensive desert storage testing. Data derived to date promise equitable resolution of the standardization program within the next two years.

To facilitate overall management and smooth the flow of paperwork and reimbursable accounting, AFLC depends upon formal Interservice Support Agreements. Negotiated and updated annually, these spell out the details governing MASDC's relationships with the Services. These relationships can become quite complex, witness one aircraft transfer situation involving a foreign government, several private contractors (U.S. and foreign), and elements of the U.S. Navy, the U.S. Air Force, the State Department and the Federal Aviation Agency. Unless clear-cut understandings prevail, awkward and needless confusion can upset months of hard diplomatic labor. Conversely, foreign sales and grant aid programs that are well managed and smoothly executed can go a long way toward establishing and maintaining international good will.

As a result of our foreign aid/sales policies, U.S.-built aircraft are now flying in many distant skies. In the past five years, hundreds of MASDC-stored T-28's, C-47's, C-45's, C-119's, C-46's, C-54's, HU-16's, T-33's, F-84's and F-86's have gone to such countries as Argentina, Belgium, Bolivia, Cameroun, Chili, Columbia, Denmark, Ethiopia, France, Guatemala, Iceland, Israel, Italy, Kenya, Nepal, Peru, Somali, Spain and Vietnam. Generally, the aircraft were flown to their destinations after complete revitalization—overhaul, repair and/or modification—and are today in daily use throughout the globe. Some, despite their age, have appreciated considerably in value and are worth more on the open market than was paid for them by the recipient country.

In addition to foreign aid programs, the past five years have seen almost 400 aircraft donated for memorials or transferred to other Government agencies such as National Aeronautics and Space Administration (NASA), the Atomic Energy Commission, Department of Agriculture, U.S. Public Health Service, U.S. Forest Service, U.S. Coast Guard and the Bureau of Fisheries and Wildlife. The aeronautical engineering departments of many schools and universities are also benefiting from classroom and laboratory use of aircraft and engines obtained as excess from the desert bonanza.

Since flyable aircraft in good structural shape best meet operational requirements, MASDC's preservation efforts are chiefly directed toward maintaining its inventory "healthy." Some 65 percent of the current crop can be considered in this category. Of the remainder, 25 percent are in various stages of dismantlement, and 10 percent are shells or hulks, stripped of all useable parts with little chance of being made flyable again.

The benign desert environment with its low moisture and low acidic soil content has proven ideal for storage. It has eased MASDC's load in the discharge of geriatric functions. In many respects, climatic conditions are not unlike those of Cyrenaica in Africa, where the B-24 "Lady Be Good" was found. This World War II bomber, abandoned by its crew after a forced landing in 1943, was discovered and found to be in a remarkable state of preservation after 16 years of exposure to the elements—radios worked, servo motors and hydraulic pumps readily operated, and trapped fuel and oil proved safe for use. Exhaustive laboratory tests by Wright-Patterson AFB personnel of selected components removed from this aircraft have verified the remarkable preservative powers of the desert.

The uses to which hardware stored in MASDC's arid sanctuary can be put are many and varied. Let's look at a few examples of what might be termed "terminal weapon system management."

An ingenious official of the Agency for International Development turned to MASDC for help some time ago when the Indian government ran into difficulties while constructing the Rojasthan Canal. Two-wheel carts that would not sink into sand and could be towed by camels were needed. Using excess wide-tread airplane tires, wheels and axles furnished by MASDC, a thousand simple yet effective "sandbuggies" were constructed which assisted materially in speeding

Veteran aircraft no longer needed for active service are stored in spacious outdoor lots at MASDC near Phoenix, Ariz.

up excavation for this vital Indian lifeline.

A classic example of American ingenuity to support NASA's space effort can also be traced to MASDC's resources. Severe shipment problems had been encountered with missiles built and assembled in West Coast plants but destined for Cape Canaveral shots. Overland shipment was impossible because of rail and highway space and clearance limitations; water shipment was too costly, damaging and time consuming. Turning to MASDC's excess C–97 Stratocruisers as foundations, an enterprising group of engineers were able to construct the mammoth and almost unbelievable "Pregnant Guppy" and, subsequently, the even more unbelievable "Super Guppy." As a consequence, complete, assembled West Coast missiles are housed in these enormous airframes and flown to destination, intact and with minimum time loss, to meet NASA's demanding time schedules.

Additional MASDC support to NASA's space effort has come in the form of excess C–54's and C–121's for satellite ground-station calibration and downrange instrumentation checking. And, to a degree, NASA's research effort is helped by excess KC–97 carcasses, utilized in a special project simulating an orbiting space station.

The list goes on and on—C–45's and C–47's to the Department of Agriculture for development of techniques leading to control of the screw worm fly; a C–47 to the City of New Orleans for its highly successful mosquito control program; low-time J–57 engines from stored B–52's to replace high-time engines; venerable C–47's from desert storage to modification centers for installation of 7.62 miniguns and subsequent assignment to Southeast Asia in key ground support roles; 20mm guns excess to stored Stratojets; 25 J–73 engines to support F–86's of an Air Force Military Assistance Program; C–54 airframes for experimentation in the development and verification of valuable nondestructive testing techniques—the vintaged veterans keep yielding returns limited only by imagination and knowledge of resources.

How can eligible parties participate in this bonanza?

Figure 1 portrays the management control channels for access to MASDC resources. Inquiries concerning sale of surplus aircraft and components should be directed to:

Chief, Defense Surplus Sales Office
Defense Logistics Services Center
P.O. Box 15035
Tucson, Ariz. 85708

The Defense Surplus Sales Office, a field activity of the Defense Logistics Services Center, conducts sales of all Army, Navy, Air Force, Marine Corps, Defense Supply Agency and U.S. Coast Guard aircraft on a national basis.

Questions concerning donations, transfers, etc., of aircraft or components may be directed to:

Commander
Military Aircraft Storage and Disposition Center
Davis-Monthan AFB, Ariz. 85707

Inquiries are welcomed, particularly if they involve governmental utilization of parts, equipment, or aircraft which normally would have no further application other than open-market disposition to the highest bidder.

In summary, MASDC is truly a national resource—in terms of stored, on-the-shelf aircraft, in terms of parts support for supply replenishment and in terms of insurance against unforeseen requirements. MASDC's objective is to maximize the return to the Defense Department on this $4.9 billion desert inventory. A used inventory, true, yet one that still retains a strong measure of vitality as auxiliary, secondary, stand-by airpower.

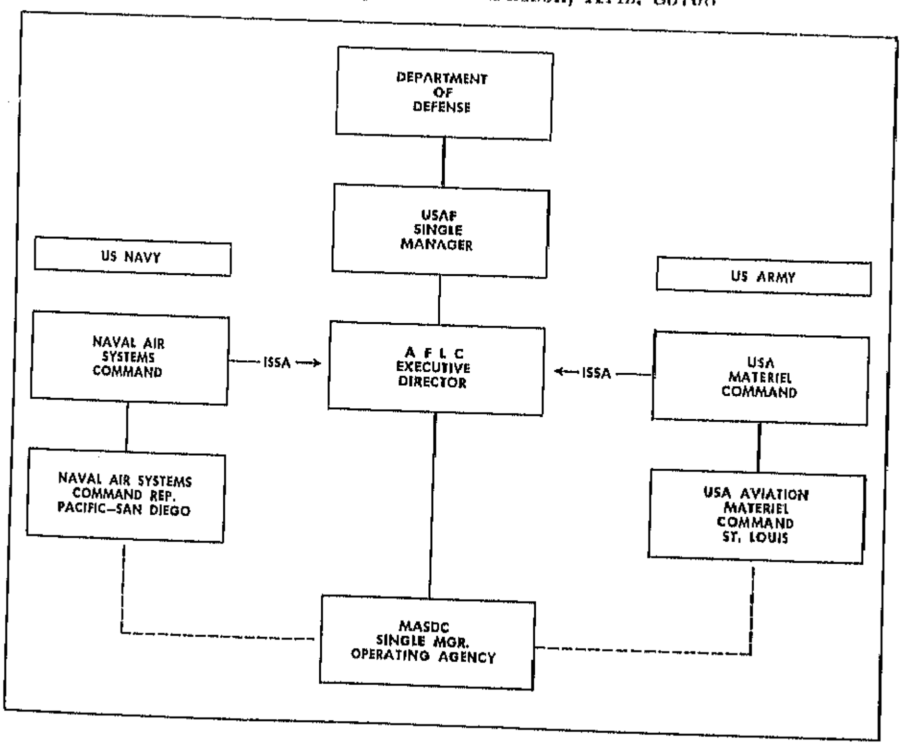


Fig. 1

Oriential Characters Now Speedly Reproduced with New Photo Composing Unit

The U.S. Army has purchased two unique ideographic photocomposing machines which will make it possible, for the first time, to prepare copy for printing in the intricate characters of the Japanese, Chinese and Korean languages.

The machines will be used in the production of offset printing plates for the high-speed roll-fed and sheet-fed presses used by the Army.

The machines, which operate similarly to a typewriter, have keyboards on which the ideograph is composed by striking keys corresponding to the various strokes of a character.

The keys generate a code that is used to search the memory drum of the machine. The memory drum then directs the illumination of an ideographic character matrix containing the particular ideograph that has been selected on the keyboard.

The character is displayed on a verification kinescope and, if verified by the operator, is exposed on film. The ideograph is automatically placed in its proper position in relationship to the characters that have already been selected and photographed.

AFSC Announces Organization Changes

The Air Force Systems Command AFSC has made several organizational changes to increase efficiency in staff structure and meet the requirements of the evolving systems and technological changes of the Air Force.

The changes, all of which became effective Feb. 1, 1967, include the creation of a new Deputy Chief of Staff (DCS) for Operations. Brigadier General F. M. Rogers was named as acting DCS for Operations. He will be responsible for all resources planning, including facilities, manpower and organization necessary to insure the continued capability of the command to accomplish its mission. This includes monitoring the test and evaluation of operations of the command.

Another staff change is the reassignment of the functions and responsibilities of the Office of the Deputy Commander for Space to other appropriate staff agencies. For example, those functions formerly carried on by the Deputy Commander for Space which pertain to the development of space systems have been transferred to the DCS for Systems.

In other changes, the DCS for Foreign Technology has been redesignated DCS for Intelligence; DCS/Plans was redesignated DCS/Development Plans; and the office of the Headquarters Commandant was established as a special staff office. DCS/Intelligence will continue to serve as the focal point for monitoring the foreign technology program. Also, the General Accounting Office Activities function was assigned to the DCS/Procurement and Production.

Bids Invited on New Weather Computers

Ten computer manufacturers have been invited by the Air Force Systems Command's Electronic Systems Division (ESD) to submit proposals for replacement of electronic data processing equipment at Offutt AFB, Neb., to be used in the automatic processing of weather information.

The replacement equipment, according to Col. Sylvester P. Steffes, head of the EDP Equipment Office of ESD, will be used by the Air Weather Service of the Military Airlift Command.

Equipment will consist of four interconnected computer systems and will replace two IBM 7094–I computers, two IBM 1401 computers, and one International Telephone & Telegraph Company computer commonly referred to as ADX 7300.

The four systems must be installed in a time-phased schedule calling for the first to be operational in January 1968, the second in April 1968, the third in July 1968, and the last one in August 1968.

Vendors will be asked to demonstrate equipment and software proposed for the system. During the live test demonstration, vendors will be required to compile and execute FORTRAN programs. In addition, they will be required to demonstrate their ability to run present operational programs on the proposed equipment through the use of emulation, simulation, or translation techniques.

Invited to submit proposals for the project were: Control Data Corp.; Electronics Associates; General Electric; General Precision; I.B.M.; National Cash Register Co.; Philco; R.C.A.; Scientific Data Systems; and UNIVAC Division of the Sperry Rand Corp.

Re-Entry Communications Blackouts Studied

The Air Force is conducting a series of six experiments to study space re-entry communication "blackout" by measuring the plasma noise—similar to the hissing sound of a radio turned between stations—which can interrupt radio communications with an object re-entering the earth's atmosphere.

To study noise caused by plasma, which is formed by the breaking up of molecules from intense heat generated by friction with the atmosphere, a 60-pound experiment package will be boosted to an altitude of 200 miles by a four-stage Trailblazer rocket.

The package will then turn and be blasted back toward the earth. When the payload passes the altitude where noise begins (about 300,000 feet) it will be traveling some 12,000 miles an hour.

Instruments inside the nose cone will sample noise at the front, center and back sections. Telementry will be recorded making recovery of the nose cone unnecessary.

The six experiments are being launched for the Air Force by the National Aeronautics and Space Administration from Wallops Island, Va., and will be concerned with techniques of achieving continuous communication during re-entry.

The Ohio State University Research Foundation has been awarded a $80,000 contract by the Air Force Avionics Laboratory for the experiments. The Avionics Laboratory is part of the Research and Technology Division of the Air Force Systems Command.

New Antenna Concept Tested by AFCRL

A novel new antenna, that may well become the prototype of a new class of antennas, is now under construction by the Air Force Cambridge Research Laboratories, Bedford, Mass.

The antenna covers some 90 acres and consists of an array of 130 dipoles set roughly in a circle measuring 2,040 feet in diameter. The antenna is being built at Sudbury, Mass., and will be ready for tests in the spring of 1967.

Performance of the antenna will be distinguished by its high angular resolution. Resolution is expected to be four times that of the Rayleigh criteria, which says that for an antenna with a given aperture and operating frequency, targets must have a certain separation before they are resolved. This high resolution, in turn, carries with it the implication of greatly enhanced target discrimination capability, a major Air Force operational goal.

The antenna operates somewhat like an interferometer. Phase and amplitude of a signal reaching pairs of dipoles are compared, and these, in turn, are correlated with the phase and amplitude of signals reaching other dipole pairs.

After performance of the antenna has been evaluated, it will be turned over to the Space Physics Laboratory as a permanent radio astronomy facility. Its relatively low frequency of about 6.5 MHz, where radio observations with high resolution telescopes have not been possible in the past, will give radio astronomers a unique research tool.

Prototype of Deep Ocean Rescue Craft Due in June 1968

The first operational prototype of the Navy's new Deep Submergence Rescue Vehicle (DSRV) is scheduled to be delivered in June 1968. The new vessel will provide the Navy with on-the-scene submarine rescue capability anywhere in the world within 24 hours.

The DSRV is 49 feet long and is designed to rescue 24 crewmembers at a time from a distressed submarine. It will be capable of performing rescue missions at depths of up to 3,500 feet.

The spheres, each seven and a half feet in diameter, are connected side-by-side. The middle sphere has a bottom opening that leads down to the distressed submarine. Openings are also on each side allowing access to the other two spheres.

Rescued crewmen are placed in either the right or left sphere and the center one. The third sphere is used for controls and houses pilot, co-pilot and medical corpsman.

ABOUT PEOPLE

DEPARTMENT OF DEFENSE

Dr. Peter A. Franken was appointed Dep. Dir., Advanced Research Projects Agency, Jan. 30.

Charles A. Fowler has been named Dep. Dir., Defense Research and Engineering for Tactical Warfare Programs.

Brig. Gen. William R. Kraft Jr., USA, has been designated Dir., Western Hemisphere Region, Office of the Asst. Secretary of Defense (International Security Affairs).

New assignments at the Defense Communications Agency include **Col. John P. Walsh,** USAF, Chief, Research and Development Div., and **Col. Clinton A. Parrish Jr.,** USAF, Project Manager, AUTODIN Project.

Col. Chelsie R. Fincher, USAF, has been assigned as Dep. Commander, Subsistence Regional Headquarters, Defense Personnel Support Center, Brooklyn, N.Y.

Col. William L. Phillips, USAF, has been assigned as Dir., Commodity Procurement and Production, Defense Fuel Supply Center.

Capt. Edward C. Oldfield Jr., USN, has been reassigned as Dep. Commander, Defense Industrial Supply Center, Philadelphia, Pa.

DEPARTMENT OF THE ARMY

Maj. Gen. John Norton has been named to relieve **Brig. Gen. Howard F. Schiltz** as Commanding General, U.S. Army Aviation Materiel Command, St. Louis, Mo.

Dr. Colin M. Hudson has assumed duties as Dep. for Research and Engineering and Chief Scientist at the U.S. Army Weapons Command, Rock Island, Ill.

Brig. Gen. Edwin I. Donley has assumed command of the Army Mobility Equipment Command, St. Louis, Mo., relieving **Brig. Gen. Thomas B. Simpson,** who has retired.

Norman L. Comus has been named Dep. Dir, Ground Support Equipment Laboratory, U.S. Army Missile Command, Redstone Arsenal, Ala.

Col. John F. Polk is the new deputy to the Commanding General, U.S. Army Test and Evaluation Command, Aberdeen Proving Ground, Md.

Lt. Col. Donald H. Steenburn is the new Chief, Chaparral Management Office, U.S. Army Missile Command, Redstone Arsenal, Ala.

DEPARTMENT OF THE NAVY

RAdm. Robert R. Wooding has relieved **Capt. George E. Fischer** as Commander, Southwest Div., Naval Facilities Engineering Command. Capt. Fischer has resumed duties as Dep. Commander of the division.

RAdm. Harry C. Mason has been assigned as Vice Commander, Naval Electronics Systems Command, from duty as Dep. Commander for Research and Development, Naval Ships Systems Command.

RAdm. J. J. Stilwell will succeed **RAdm. W. F. Petrovic** as Dep. Commander for Shipyard Management, and as Program Director for Shipyard Modernization, Naval Ship Systems Command, in April.

Capt. Floyd W. Gooch Jr., Planning Officer at Portsmouth, N.H., Naval Shipyard, will assume command of the Philadelphia Naval Yard in April.

Capt. Manuel da C. Vincent has relieved **Capt. D. K. Ela,** as Commanding Officer and Dir. of the David Taylor Model Basin, Washington, D.C.

Capt. Sidney Sherwin Jr. has assumed command of the Pearl Harbor Naval Shipyard, relieving **RAdm. E. Alvey Wright,** who has retired. Capt. Sherwin will head the shipyard until a flag officer is ordered to relieve him.

DEPARTMENT OF THE AIR FORCE

Gen. John P. McConnell has been reappointed as Chief of Staff, U. S. Air Force, for a second two-year tour.

Gen. John D. Ryan has been assigned as Commander in Chief, Pacific Air Force, relieving **Gen. Hunter Harris,** who has retired.

Lt. Gen. Joseph J. Nazzaro succeeds Gen. Ryan, as Commander-in-Chief, Strategic Air Command, with concurrent promotion to the grade of general.

Lt. Gen. Keith K. Compton will move from the position of Air Force Dep. Chief of Staff (Plans and Operations) to fill the post of Vice Commander-in-Chief, Strategic Air Command, formerly held by Gen. Nazzaro. **Lt. Gen. Glen W. Martin** has been assigned as Dep. Chief of Staff (Plans and Operations), Hq., USAF.

Maj. Gen. James T. Stewart has been assigned as Dir. of Space in the Office of Dep. Chief of Staff (Research and Development), Hq., USAF.

Maj. Gen. Harold E. Humfeld has been named as Dir. of Maintenance Engineering in the Office of the Dep. Chief of Staff (Systems and Logistics), Hq., USAF.

Maj. Gen. Theodore R. Milton has been nominated for promotion to lieutenant general and assignment as Inspector General of the Air Force.

Brig. Gen. Russell A. Berg has been transferred from duty as Dep. Dir., Manned Orbiting Laboratory Program, to duty as Dir., Office of Space Systems, Office of the Secretary of the Air Force.

New assignments in the Air Force Systems Command are: **Maj. Gen. Charles H. Terhune, Jr.,** Vice Commander, AFSC, from duty as Commander, Aeronautical Systems Div.; **Maj. Gen. Glenn A. Kent,** Dep. Chief of Staff (Development Plans) Hq., AFSC; **Brig. Gen. Walter R. Hedrick Jr.,** Asst. Dep. Chief of Staff (Systems) Hq., AFSC; **Brig. Gen. Felix M. Rogers,** Asst. Dep. Chief of Staff (Development Plans) Hq., AFSC; **Col. John E. Hicks,** Chief, Bio-Chemical Div., Armament Development Laboratory, Air Proving Ground Center, Eglin AFB, Fla.; **Col. Milo L. Seccomb Jr.,** Dir., Cost Analysis, Hq. AFSC; **Col. David E. Galas,** Air Force Plant Representative, Northrop Corp., Hawthorne, Calif.; **Col. James B. Tapp.** Dir., Range Operations, Air Force Western Test Range, Vandenberg AFB, Calif.; and **Col. Richard C. Doom,** Dir., Research and Technology, Space Systems Div.

Assignments in the Office of the Secretary of the Air Force are: **Col. David M. Falk,** Asst. Dep. Dir., Plans and Policy, Office of Space Systems; **Col. Alfred J. Lynn,** Dep. Chief, Information Div., Office of Information. **Col. Carl. G. Schneider,** Executive to the Asst. Secretary of the Air Force (Financial Management); **Col. Byron V. Pepitone,** Executive to the Dep. Under Secretary of the Air Force (Manpower).

Assignments at Hq., USAF, include: **Col. William R. Joyner,** Executive Officer, Dep. Chief of Staff (Systems and Logistics); **Col. Lester E. Manbeck,** Chief, Communications and Electronics Div., Directorate of Aerospace Programs, Dep. Chief of Staff (Programs and Resources); **Col. Joe M. Whitefield,** Asst. for Policy, Dep. Chief of Staff (Systems and Logistics); and **Col. Edward F. Byers,** Chief, Nuclear Power Div., Directorate of Science and Technology, Dep. Chief of Staff, (Research and Development).

Navy Gets New Shark Repellent Device

The Navy has developed a new type of shark repellent device which has successfully passed a series of tests demonstrating that it is effective against various types of sharks.

The new survival gear is a five-foot long plastic bag which screens a man in the water from any sharks that might be in the vicinity. The bag is filled with water and supported by inflatable cuffs or rings attached to the top of the bag. The man, supported by his life jacket, floats inside the bag. This method prevents blood from wounds or other human evidence from being sensed by man-eating sharks.

Black in color with orange cuffs, the device can be made of commercially available strong, lightweight, mildew- and decay-proof plastic materials.

FROM THE SPEAKERS ROSTRUM

Excerpt from address by Hon. Robert H. Charles, Asst. Secretary of the Air Force (Installations & Logistics), to the Washington Chapter of the American Ordnance Assn., Washington, D.C., Feb 15, 1967.

Hon. Robert H. Charles

The Problem of Long Lead Time

* * * * * * * * * * *

Since most of you are related in one way or another to this country's industrial effort, I would now like to discuss one of our industrial troubles with you, namely, long hardware lead times.

There is nothing good, to us, about long lead times. On the contrary, there are at least three extraordinarily onerous results:

• National defense, particularly when a war is being fought, involves rapidly and almost constantly shifting requirements. After all, we don't do the enemy's planning for him. So if it takes a long time to get a needed product, our response to changed requirements becomes almost glacial in its speed, unless we overbuy in the first place to meet all possible contingencies. This would be unfair to the taxpayer.

• Having ordered a long lead time item, suppose the requirement changes or the volume is reduced after it is 80 percent complete. We then have the agonizing choice of terminating something at 80 percent of its completed cost and receiving nothing, or completing the purchase of a substantially unneeded item. We usually end up doing the latter because it may then be worth 30 percent of its original cost, and the added cost of completion is then only 20 percent.

• This result is perhaps least understood and most insidious. We become locked into a given design over a longer period, thereby inhibiting the incremental incorporation of major improvements, but even more important, of wholly new systems. This results in systems which are at all times less up-to-date and effective than they should be. It also creates a psychological barrier to force modernization. If, being required by long lead times to buy fewer systems but in larger quantities of each, we find ourselves with a very large inventory of an 85 percent effective weapon, there is some resistance to phasing down all those assets, which cost so much in effort, money and time, in order to acquire a 95 percent effective weapon.

In short, long lead times limit our response to changing world conditions and to the rapidly shifting requirements of defense, increase the possibility of accumulating unneeded or obsolescent inventories, and inhibit modernization. So I ask the question: Why should any customer, particularly a customer who is responsible for the national defense, be thus burdened? And if you don't think that this load is a full-feathered albatross, just ponder the problem when the lead time for a fighter increases some 35 percent, as it has, over what was already too long a lead time, i.e., almost a year and a half. This means that in order to be sure to have it if we need it, we must commit ourselves, almost two years before its delivery, to an item which changed conditions may render less effective than we desire even before we get it. And this for an item already in production.

Let me put it in a nutshell: Industrial technology and capacity are part of the lead time problem; and it's time we did something more about it.

Here are two specific suggestions:

• In searching for new and improved technology and manufacturing methods, added emphasis should be placed on increasing the speed of the manufacturing process as well as improving the quality of the product and reducing its cost. Industry should do more of this on its own. The Air Force will, of course, continue to sponsor research in technical areas, particularly where its only application appears to be military. But rare indeed is the new military manufacturing technique or material which does not ultimately find its way into commercial use. We need more new private initiatives in this area.

• Industry should put more of its own money into new and improved tools of production, thereby increasing overall capacity. I can understand a reluctance, without meaningful incentives, to make substantial capital investments in special purpose equipment, or in equipment for temporary or one-shot procurement including wartime surge requirements. But I cannot understand this reluctance if the requirement appears to have reasonable stability in a nonwartime environment, particularly where the new manufacturing equipment can do a better job faster and at lower cost. The airlines do not provide machinery and equipment to the manufacturers of commercial aircraft. Why should the Air Force do so on military programs having reasonable stability? An important feature of the total package procurement concept, under which the C-5 is being built, specified that the manufacturer would furnish all additional facilities for that program, and Lockheed and General Electric are doing so. I should add that, as far as aircraft are concerned, what shortages and increased lead times do exist are more the result of commercial work than of military. For the first time in history, in 1967, more pounds of aircraft will be delivered to commercial users than to the military. Deliveries of new commercial

aircraft are scheduled to spurt from 221 in 1966 to 436 in 1967, and increase of almost 100 percent.

What I am saying is that industry should finance the machinery, equipment and other capital assets not only for its civilian business, but also for its medium to long-range military business.

As indicated earlier, I have made this pitch before. The reaction is reported to be that industry was badly burned by investments during the Korean conflict and now wants a better assurance of use before investing capital in long lead time equipment. That reaction, in my view, misses the mark. I am not talking about temporary or one-shot requirements, such as wartime surges. I am talking about medium to long-range military requirements, and only those, of such items as the C-5, the F-111, the A-7, etc. And speaking of the C-5, I noted with interest, and do not question its accuracy, an industry study which indicated that if a 200,000-ton, closed-die forging press were available today, on 200 C-5's almost $70 million could be saved in manufacturing costs, and an additional $30 million in operating costs due to reduced weight. The total is substantially more than the estimated cost of the press. If this is so on this one program, think how much more would be saved in the next 10 years on all programs, including such commercial projects as the 747 and the supersonic transport. In view of industry's sharing 100 percent in cost reductions on commercial aircraft, and a sizeable amount on military programs—for example, on the C-5 the airframe contractor's share is 50 percent below target and 30 percent above—I ask again why industry does not think it would be in its own best interest to build and operate such equipment.

I am not suggesting that any company, even if it had the resources, should do such a thing by itself. After all, no company knows in advance that it is going to win a major program, and the time to design, build and shake down such facilities is much longer than the period from airplane development go-ahead to cutting of production hardware. What is known, however, is that some company will win each program and that it, and the nation, will benefit from the existence of a facility that can save $98 million on one program. Let me suggest, therefore, that industry consider a consortium to finance, and perhaps operate those facilities that are too expensive for one company prudently to undertake. This would not be new. For example, many years ago when the industry was much smaller and even relatively low speed wind tunnels were in this category, a consortium was formed to build the tunnel at Pasadena.

The next question, of course, is that if the nation will benefit from such facilities, why shouldn't the Government put up the money. The answer is so deeply ingrained in our system that I am surprised it is asked. Without debating its merits vis-a-vis capitalism, let me read to you the first definition of "socialism" in Webster's Unabridged: "A . . . social organization based on . . . governmental ownership . . . of the essential means for the production and distribution of goods." We should all keep this definition in mind. I recognize, of course, that words like "socialism," "capitalism," and "free enterprise" are what might be called "color words." There are few polar choices in this ambiguous world. Nevertheless, there are meaningful distinctions between them; and industry—and the nation—should not expect to continue to reap the benefits of capitalism and free enterprise without shouldering its burdens. We can't have it both ways.

And if you think this is an idle warning, listen to what John Kenneth Galbraith said recently:

> **"The line that now divides public from so-called private organization in military procurement . . . is so indistinct as to be nearly imperceptible. . . . the mature corporation will eventually become a part of the larger administrative complex with the state. In time, the line between the two will disappear. Men will look back in amusement at the pretense that once caused people to refer to General Electric . . . or DuPont as 'private' business."**

Now, listen to the conclusion:

> **". . . and if the mature corporation is recognized to be a part of the state or some penumbra of the state, it cannot plead its inherently private character . . . as cover for the pursuit of goals of primary interest . . ."**

As with all syllogisms—and I do not use the term in derogation—Mr. Galbraith's conclusion is right only if his major premise is right; namely, that mature corporations, particularly in defense business, are becoming part of the state. That premise need not be right. But it will be if defense industry does not become more resourceful in restoring its "inherently private character." I repeat. We can't have it both ways.

Excerpt from address by Capt. R. J. Schneider, USN, Asst. Commander for Research and Technology, Naval Air Systems Command, at Annual Meeting of the American Institute of Aeronautics and Astronautics, Boston, Mass., Nov. 29, 1966.

Capt. R. J. Schneider, USN

Forecast of the Navy Aerospace Posture

* * * * * * * * * * *

The Attack Carrier.

. . . The tactical missions of the carrier have evolved and changed throughout the years and it seems well founded to state that the attack carrier is, and will remain, the backbone of Navy tactical strike capability in the foreseeable future. On the national scale, the attack carrier capability is, and appears to be for the future, one of the major building blocks of the U.S. security posture.

Aircraft weapon systems of the 1970's will probably look much similar to those in and entering the Fleet today. Limited conflict, as well as "police action," in areas remote from

the U.S. geographic base, remain as probabilities so that emphasis on relatively conventional weaponry developments is not going to diminish. However, the Navy must also give continuous attention to the possibilities of major nonnuclear and nuclear war. Attack carrier air wings must be capable of carrying out across-the-board strikes against land and sea targets. They must be capable of conducting missions in anti-air, close-air support, reconnaissance, mining and antisubmarine warfare. The ability to conduct these missions under all-weather conditions is improving rapidly. We must go further and essentially turn "night into day" so far as the total effectiveness of our capability is measured.

Fighter and Attack Aircraft.

What are a few of the salient trends and requirements indicated for attack and fighter-attack aircraft and their primary weapons?

The ultimate in aeronuatical performance has certainly not been attained; speed, range, altitude, maneuverability, acceleration, etc., can all be improved. In aircraft weapon systems, however, high performance is only part of total system effectiveness and versatility. Cost effectiveness is not just a comptroller's tool. Reliability and its close relative maintainability are highly important components of availability. Maximum performance, if not available, is no performance at all.

In both fighter and attack aircraft an important objective should be improved target identification, target acquisition, and accurate weapon delivery, on the first pass. Having to stay around for second and third passes throws away a warrior's best defense, surprise, no matter how high his basic aircraft performance may be!

Low-level penetration into highly defended hostile areas markedly improves survivability and we want foolproof, fail-proof terrain-avoidance and terrain-following systems.

Fully effective, multi-mission aircraft are being widely studied. To attain multi-mode capabilities without compromise to any one mission is a technological challenge in almost every aeronautical and avionic specialty. We should be able to get there in the mid- or late 1970's.

Advances in automation, pilot's display and information transfer, man-to-machine and machine-to-man, permit smaller crews. I don't have time to debate pro's and con's of single- versus dual-place aircraft specifically, but man is a very expensive commodity to carry, in weight, vulnerability, training and maintenance costs. Each combat warrior reflects big multipliers back into every aspect of defense management and financing.

Anti-Air Warfare.

Anti-air defense of a naval task force postulates coordinated actions of fighter aircraft and surface-to-air missiles for a "defense-in-depth."

Trends in fighter aircraft development will continue along lines of increased speed, range and endurance. Some versions of the F-4 series aircraft will still be in the Navy inventory. These will carry the up-to-date versions of Sidewinder and Sparrow missiles. The F-111B development offers increased interception range, time on station, and the longer range Phoenix missile capability. Its fire control system provides for multiple target attack.

This airplane and its missile system still must complete various evaluation phases prior to production decisions.

It would seem clear that the advantages of a variable-sweep, "swing-wing" principle, increased air-to-air missile range, and multiple-target track while scan fire control system have been feasibility verified and that next generation developments will go forward from these "bench marks." Again I would emphasize avionic technology improvement by size and weight reduction and reliability and versatility increase as holding the key to improved single or multiple mission effectivity.

The future trends for naval surface-to-air missiles must include coping with faster, smaller, harder targets. We must increase effectiveness against very low altitude targets, in any weather, day or night, and in a full electronic countermeasure environment. We should be able to destroy stand-off weapons as well as their mother aircraft. Point defense systems of small enough size and weight for installation in our lesser ships are becoming feasible. . . .

Air-to-Surface.

Our attention is strongly directed to highly accurate missiles for point targets. Our ultimate objectives include all-weather, day and night guidance, warhead mechanization properly balanced to the target hardness, and appropriate stand-off range for various missions. Present state of the art is well typified in the Walleye and Condor developments.

In ARM (anti-radiation missiles), future descendants of the Shrike family will move towards higher velocity and better guidance features. The strike aircraft going against a hostile defensive guided missile complex is essentially engaged in a rather personalized duel. Winning the draw and having one lesser time to target are the keys to success and survival. When we succeed in gaining relative immunity from the hostile missile defenses, we decrease the requirements for stand-off range, reopen the medium altitudes for use, and reduce the danger from defensive small arms fire.

Rapid strides are being made in all the bit-and-piece technologies: radar and infra-red, low-light level TV, microwave radiometry, miniaturized inertial schemes, explosives, warhead kill mechanization, fuzing and pilot diplays. . . .

Unguided weapons will not become obsolete and here is a fertile field for improvements; bombs, bomblet-clusters, hypervelocity rockets and other weapons of these types have a special place in an armament inventory because of their low price, simplicity, ruggedness in storage, and high cost and system effectiveness for many applications.

Ship-to-Ship/Surface.

A few words should be given to ship armament, specifically referring to the field once dominated by the main battery guns.

There is some development in small bombardment rockets and several light-weight gun systems. We think there is a place for a longer range ship-launched missile system and are presently studying possible adaptation of the Army's Lance missile program.

Advanced Early Warning.

Carrier based early warning and long-range surveillance against both air and surface targets will continue as an important requirement. Some-

thing like the E2A aircraft will be needed in our inventory. Improvements in detection range, clutter reduction and data management are most significant to this mission. Fighter direction of long-range interceptors has been incorporated in this mission for some time and experience has suggested secondary control of long-range strike missions as a corollary usage.

Antisubmarine Warfare (ASW)

Antisubmarine warfare remains high in Navy priority. But without some revolutionary breakthroughs in physical science we must continue the slow struggle towards increased efficiency of known effects. Sophisticated signal processing to extract every possible bit of information from each sensor and efficient data processing to correlate each little bit of knowledge is our chore. Integration of the total avionics package and microminiaturization of components is our only present hope to survive the deluge of electronic hardware this stubbornly resistive warfare area requires. It must be reliable equipment or the whole effort is wasted.

Replacement for the aging S-2 design is required during the 1970's and we are planning for it in the VSX concept. This aircraft must embody those trends I have just mentioned and in reduced size follow on in the ANEW pattern of the present P-3 airplane. The many operating functions will be centralized into an integrated display system under computer support for management of the almost infinite detail. But the operator will be aided rather than replaced by the computer. Critical problems of detection, classification and localization are expected to be solved more quickly. Better integration of the various systems is expected to increase probability and accuracy of solution. Aircraft performance will be increased, permitting search of greater area further out from the CVS force and with less transit time.

The same trends observed in the fixed-wing airplane will occur in rotary-wing aircraft. Performance will be increased in the vehicle to achieve higher speed and greater endurance with a heavier payload. Improved systems integration with computer-aided control and display will be the rule. The ability to store data, compare, retrieve and compute will enhance effectiveness in this multisensor environment. Sophisticated signal processing will be more extensive for sonar acquisition and target location. Improved versions of the SH-3 helicopter series will be with us during most of the 1970's with a replacement up for study and development possibly late in the period.

Land-based ASW airplanes of the P-3 series are with us throughout the period. The ANEW concept, pioneered in the land-based P-3, will be improved and extended to all ASW aircraft. Largely because of weight and space considerations, newer development will most likely be proved out first in the larger ASW airplane. More automation of functions with automatic alerting devices for the operators can be forecast. Airframe and engine improvements will increase range and endurance capabilities. A follow-on airplane (VPX) will be studied for the next generation. Perhaps some remarkable discovery or invention will make undersea surveillance as efficient as our present capabilities for keeping track of objects in orbit.

Oceanography.

Closely related to ASW is the ocean environment. Navy interest in total oceanography, or "inner space," is quite natural. We are intensifying our efforts in all aspects of oceanography. Efforts have been under way for several years to predict oceanographic conditions analogous to the way surface weather is forecast. Progress has been made and the results improve ASW operations. Many similarities exist between this inner space and the higher levels of aerospace, at least as to problem areas. Much of the technology which has been developed for human survival in submarines and underwater exploration is immediately applicable to spacecraft life support systems and vice versa.

The vast distances and areas one must cover to collect data and unravel many mysteries of oceanography suggest adding aircraft platforms to the small fleet of surface and deep submergence research vessels now employed. Some specialized instrumentation possibilities are being investigated and others can be expected to exploit the high data-gathering potential of an airborne survey.

Conclusion.

I have necessarily omitted more items than I have mentioned, but there is no particular significance to the omissions except lack of time. Vertical take-off, zero length deck-launch, engine and propulsion innovations, communication, navigation, satellite and other space applications, the list goes on almost without end. These are all important.

Recapitulating some of the more challeneging technological aspects for the future:

Aerodynamics—In pretty good shape overall, though there is a good bit of work to do in the hypersonic speed ranges. Stability and control at these high velocities and also in the zero and very low speed range need some more development.

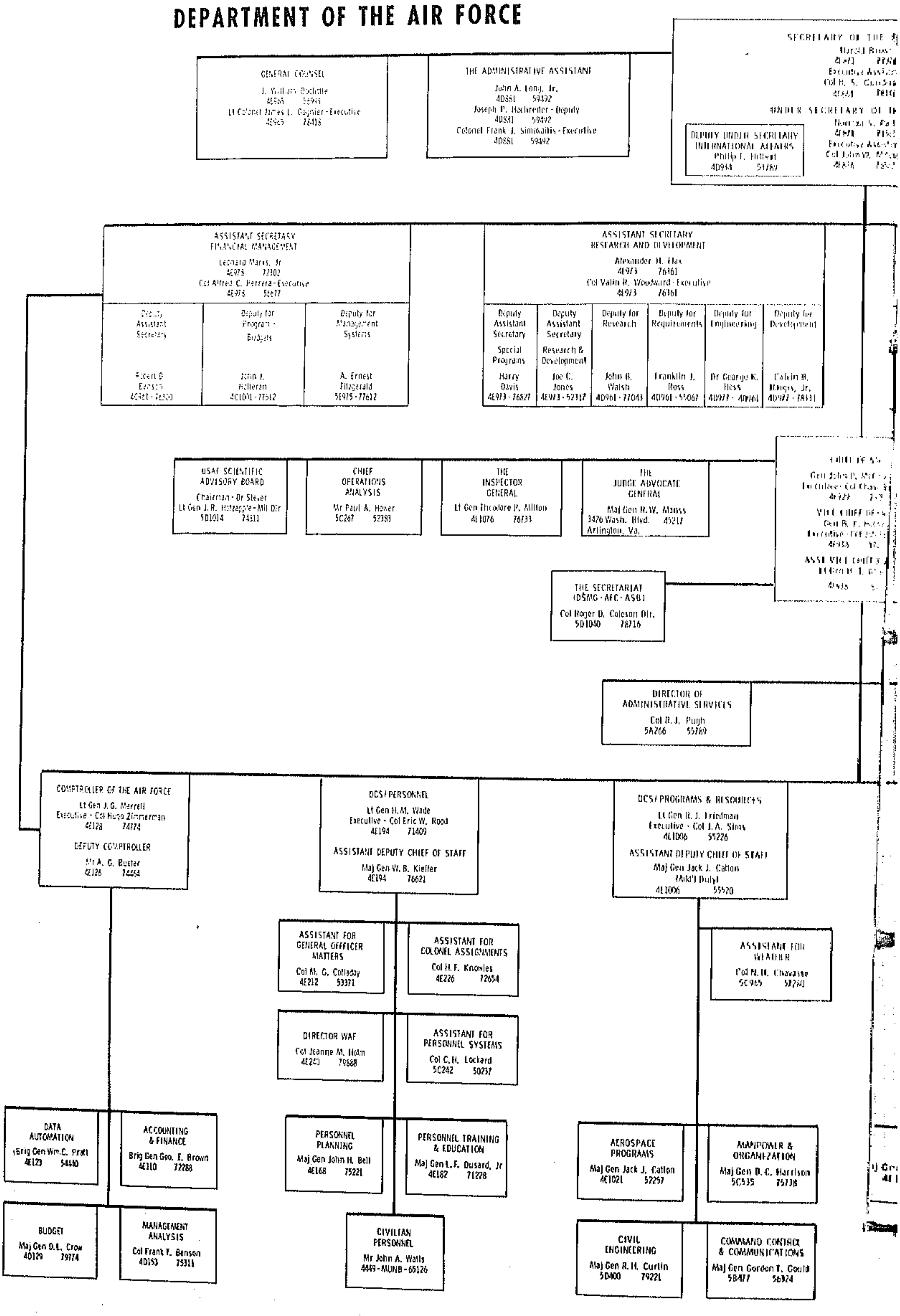
Propulsion—Almost unlimited possibilities for the future. Every advance in thrust-to-weight ratio extends our design capabilities.

Materials and Structures—Despite excellent progress, the demands of new requirements are almost unsatiable. Temperature, weight, strength and stiffness, and fatigue capabilities arbitrarily limit almost every design. Each improvement whets the appetite for more.

Avionics—We want and have to have ultra-complex electronics to meet and improve on almost every military requirement. Yet as technology permits smaller equipment to meet the need, the greater grows the demand to build in still more capability, and for versatility we want it all in every airplane or missile. Weight and size are shrinking at a very satisfactory rate. Now it is time to really get after absolute reliability. We have to get this complex equipment up to the reliability of the main wing structure before it is truly satisfactory.

General—The explosive growth of new technology has in itself become a problem. Each successful experiment points the way to new effort and at the same time raises the question of whether or not to exploit it in military hardware. We must stay alert and balanced with the best possible judgment, between trying to capitalize too soon on some new knowledge versus staying at the research level so long, looking for the last bit of proof, that a technological lead passes to the enemy.

DEPARTMENT OF THE AIR FORCE



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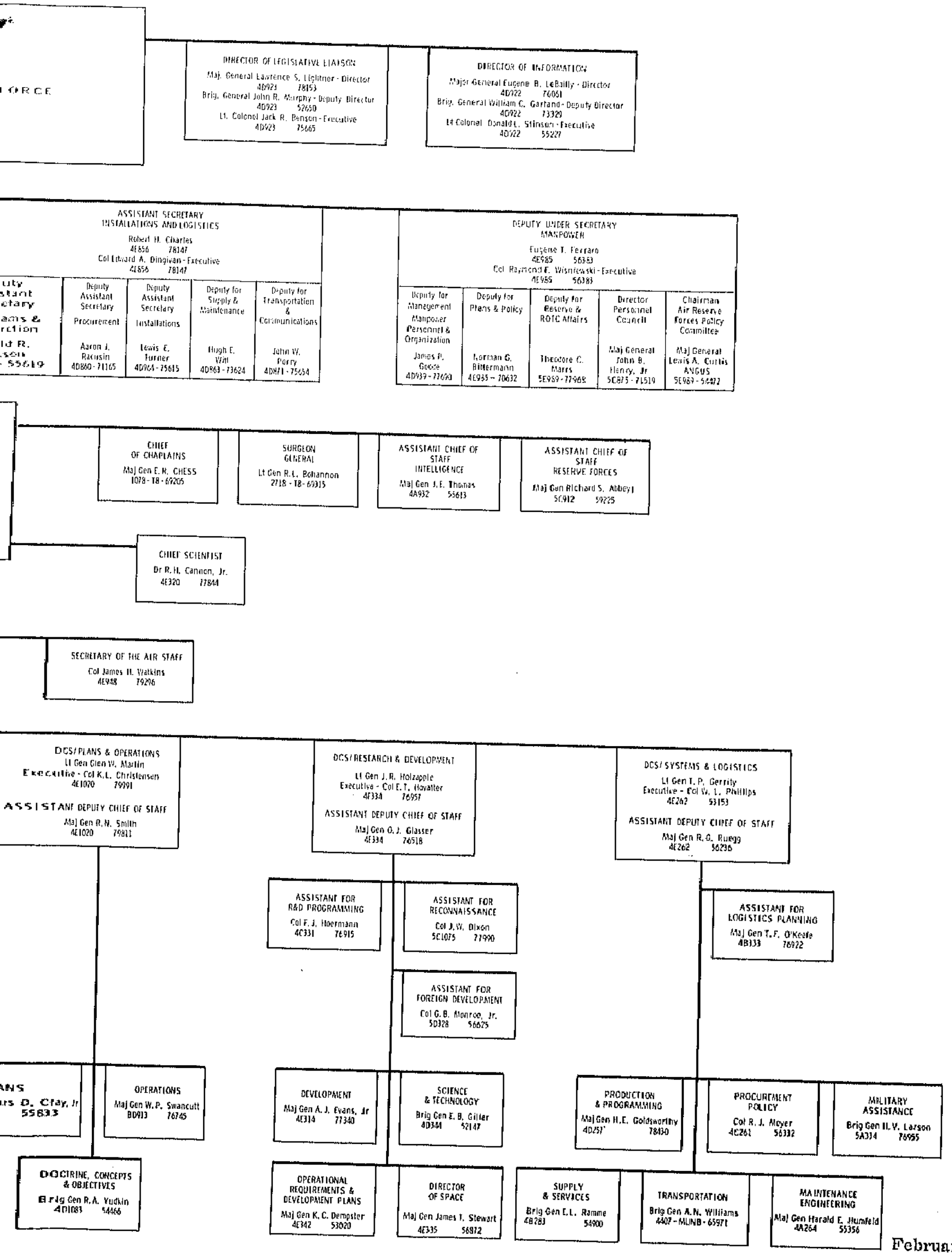
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DIRECTOR OF LEGISLATIVE LIAISON
Maj. General Lawrence S. Lightner - Director
4D923 78153
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Lt. Colonel Jack R. Benson - Executive
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DIRECTOR OF INFORMATION
Major General Eugene B. LeBailly - Director
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Brig. General William C. Garland - Deputy Director
4D922 73320
Lt Colonel Donald L. Stinson - Executive
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ASSISTANT SECRETARY
INSTALLATIONS AND LOGISTICS
Robert H. Charles
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Aaron J. Racusin 4D860 - 71165
Deputy Assistant Secretary Installations
Lewis E. Turner 4D964 - 75615
Deputy for Supply & Maintenance
Hugh E. Witt 4D863 - 73624
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Deputy for Plans & Policy
Norman G. Bittermann 4E985 - 70632
Deputy for Reserve & ROTC Affairs
Theodore C. Marrs 5E989 - 77968
Director Personnel Council
Maj General John B. Henry, Jr 5C875 - 71519
Chairman Air Reserve Forces Policy Committee
Maj General Lewis A. Curtis ANGUS 5E989 - 54473
CHIEF OF CHAPLAINS
Maj Gen E. R. CHESS
1078 - T8 - 69205
SURGEON GENERAL
Lt Gen R.L. Bohannon
2718 - T8 - 69315
ASSISTANT CHIEF OF STAFF INTELLIGENCE
Maj Gen J.E. Thomas
4A932 55613
ASSISTANT CHIEF OF STAFF RESERVE FORCES
Maj Gen Richard S. Abbey
5C912 59225
CHIEF SCIENTIST
Dr R.H. Cannon, Jr.
4E320 77844
SECRETARY OF THE AIR STAFF
Col James H. Watkins
4E948 79296
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Lt Gen Glen W. Martin
Executive - Col K.L. Christensen
4E1020 79991
ASSISTANT DEPUTY CHIEF OF STAFF
Maj Gen R.N. Smith
4E1020 79811
DCS/RESEARCH & DEVELOPMENT
Lt Gen J.R. Holzapple
Executive - Col E.T. Hovatter
4E334 76957
ASSISTANT DEPUTY CHIEF OF STAFF
Maj Gen O.J. Glasser
4E334 76518
DCS/SYSTEMS & LOGISTICS
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Executive - Col W. L. Phillips
4E262 53153
ASSISTANT DEPUTY CHIEF OF STAFF
Maj Gen R.G. Ruegg
4E262 56236
ASSISTANT FOR R&D PROGRAMMING
Col F. J. Hoermann
4C331 76915
ASSISTANT FOR RECONNAISSANCE
Col J.W. Dixon
5C1075 77990
ASSISTANT FOR FOREIGN DEVELOPMENT
Col G.B. Monroe, Jr.
5D328 56675
ASSISTANT FOR LOGISTICS PLANNING
Maj Gen T.F. O'Keefe
4B333 76922
ANS
rs D. Clay, Jr
55833
OPERATIONS
Maj Gen W.P. Swancutt
BD913 76745
DOCTRINE, CONCEPTS & OBJECTIVES
Brig Gen R.A. Yudkin
4D1083 54466
DEVELOPMENT
Maj Gen A. J. Evans, Jr
4E314 77340
SCIENCE & TECHNOLOGY
Brig Gen E. B. Giller
4D344 52147
OPERATIONAL REQUIREMENTS & DEVELOPMENT PLANS
Maj Gen K. C. Dempster
4E342 53020
DIRECTOR OF SPACE
Maj Gen James T. Stewart
4E335 56872
PRODUCTION & PROGRAMMING
Maj Gen H.E. Goldsworthy
4D257 78430
PROCUREMENT POLICY
Col R. J. Moyer
4C261 56332
MILITARY ASSISTANCE
Brig Gen H.V. Larson
5A314 76955
SUPPLY & SERVICES
Brig Gen E.L. Ramme
4B283 54900
TRANSPORTATION
Brig Gen A.N. Williams
4407 - MUNB - 65971
MAINTENANCE ENGINEERING
Maj Gen Harald E. Humfeld
4A264 55356

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MAY 1967

SPEAKERS CALENDAR

DEPARTMENT OF DEFENSE

Mr. Edward T. Jones, Staff Dir., Contractor Performance Evaluation, Office of Asst. Secretary of Defense (Installations & Logistics), at the National Contract Management Assn. Meeting, Mountain View, Calif., April 11.

Mr. Henry A. Wallace, Los Angeles Regional Manager, Defense Contract Audit Agency, at the National Contract Management Assn. Meeting, Los Angeles, Calif., April 15; at the Federal Bar Assn. Meeting, Santa Monica, Calif., April 18.

Lt. Gen. H. C. Donnelly, USAF, Dir., Defense Atomic Support Agency, at Western States Civilian-Military Traffic Safety Conference, Albuquerque, N.M., April 18; at Kiwanis Club, Albuquerque, N.M., April 19.

Maj. Gen. J. B. Bestic, USAF, Dep. Dir. for National Military Command System Technical Support, Defense Communications Agency, at Institute of Electrical and Electronics Engineers Meeting, Jackson, Miss., April 18.

DEPARTMENT OF THE ARMY

Lt. Gen. Ben Harrell, Commanding General, U. S. Army Combat Developments Command, at Assn. of U.S. Army Meeting, St. Louis, Mo., March 21; at Assn. of U.S. Army Meeting, Worcester, Mass., March 29; at Mobility Forum, Allison Division of General Motors, Indianapolis, Ind., April 12.

DEPARTMENT OF THE NAVY

Adm. David L. McDonald, Chief of Naval Operations, at Army War College, Carlisle, Pa., April 24.

RAdm. Phillip Beshany, Dir., Submarine Warfare, Office of Chief of Naval Operations, at Kiwanis Club, Columbus, Ga., May 16.

DEPARTMENT OF THE AIR FORCE

Lt. Gen. R. L. Bohannon, Surgeon General of the Air Force, at Aerospace Medical Assn. Meeting, Washington, D.C., April 10–13.

Lt. Gen. Sam Maddux Jr., Commander, Air Training Command, at Community Council Meeting, San Antonio, Tex., April 11.

Brig. Gen. P. R. Stoney, Vice Commander, Air Force Communications Service, at Collins Radio Technological Assn. Meeting, Cedar Rapids, Iowa, April 11; at Armed Forces Communications and Electronics Assn. Meeting, Maxwell AFB, Ala., April 18.

Lt. Gen. T. P. Gerrity, Dep. Chief of Staff (Systems & Logistics), at American Ordnance Assn. Meeting, Washington, D.C., April 12; at National Society of American Value Engineers Meeting, Chicago, Ill., April 24; at American Ordnance Assn. Meeting, Washington, D.C., May 11; at Inter-Agency Data Exchange, Houston, Tex., May 17.

Maj. Gen. J. W. O'Neill, Commander, Electronic Systems Division, Air Force Systems Command, at Joint Computer Conference, Atlantic City, N.J., April 19.

Hon. R. H. Charles, Asst. Secretary of the Air Force (Installations and Logistics), at National Contract Management Assn. Meeting, Baltimore, Md., April 27; at National Contract Management Assn. Meeting, Cape Kennedy, Fla., May 2.

Brig. Gen. J. S. Bleymaier, Commander, Air Force Western Test Range, at American Society for Quality Control Meeting, Vandenberg AFB, Calif., April 27.

Maj. Gen. G. T. Gould Jr., Dir., Command, Control and Communications, Office of the Dep. Chief of Staff (Programs and Resources), Hq., U.S. Air Force, at DOD Computer Institute, Washington, D.C., May 1.

AF Missile Center Gets Three-Axis Flight Simulator

The state of the art in inertial guidance testing has taken a sizable step forward at the Air Force Missile Development Center (AFMDC), Holloman AFB, N.M., with the installation of a three-axis flight simulator.

The simulator will be used by the center's Central Inertial Guidance Test Facility to test complete guidance systems at a known controlled angular rate in a simulated flight environment prior to actual aircraft flight or to rocket sled tests on the center's high speed test track.

Bolted to the concrete floor in the AFMDC Gyroscope Test Branch area, the new facility consists principally of four major subassemblies: the three-gimbaled simulator, the hydraulic drive unit, the electronic control console, and an analog computer to program the simulator.

Angular motion of aircraft flight may be simulated in all three axes, getting data in a known, controlled environment for all second generation guidance systems. In this way, a guidance system under simulated flight conditions may be evaluated. Linear motion cannot be simulated, however. The simulator is controlled in all three axes by an analog computer which is programmed for the desired motion.

The frequency and amplitude of each axis is variable and independent of the other two axes.

Air Force Awards Six Contracts For V/STOL Transport Design

Six study contracts totalling $482,000 for design of a vertical short takeoff and landing (V/STOL) light transport aircraft have been awarded by the Aeronautical Systems Division of the Air Force Systems Command.

Contractors will research and analyze various V/STOL systems, investigate different propulsion units, and prepare the best aircraft design for each propulsion system. Contracts also call for preparation of a detailed technological development program for each aircraft configuration. Design payload of the V/STOL transports will be from four to nine tons.

Information acquired under the study contracts may be used by the Aeronautical Systems Division for future development of V/STOL aircraft.

The seven-month contracts, which began in December 1966, will develop information on a V/STOL-type light transport which can respond to planned or emergency support requirements. It will operate from semi-prepared airfields, and from unprepared forward area sites.

Contracts for the work went to Vought Aeronautics Division of LTV Corp., Lockheed-Georgia Co., McDonnell Corp., Vertol Division of Boeing Co., Sikorsky Aircraft Division of United Aircraft Corp., and Lockheed California Co.

ALENDAR OF EVENTS

-6: Fourth Space Congress, Beach, Fla.

6: New York Academy of Sci- American Institute of Aeronau- nd Astronautics International ess of Subsonic Aeronautics, ork, N.Y.

7: Ocean from Space Sympo- Houston, Tex.

-7: American Institute of ects Meeting, Milwaukee, Wis.

-7: Institute of Management es Meeting, Boston, Mass.

4: American Chemical Society g, Miami Beach, Fla.

-12: American Society of Me- l Engineers Meeting, Detroit,

-12: Institute of Environ- Sciences Meeting, Washing- C.

-13: Aerospace Medical Assn. g, Washington, D.C.

-19: American Institute of utics and Astronautics Ther- ics Specialist Conference, leans, La.

20: Joint Computer Confer- lantic City, N.J.

American Society for Qual- trol Meeting, Chicago, Ill.

American Society for Train- Development Meeting, Bos- ss.

National Security Industrial Seventh Innerspace Confer- ashington, D.C.

Electronic Components Con- Washington, D.C.

May 6-7: American Helicopter Society Meeting, Washington, D.C.

May 7-12: Electrochemical Society Meeting, Dallas, Tex.

May 8-10: Fludics Symposium, Lafayette, Ind.

May 8-12: American Society of Civil Engineers Meeting, Seattle, Wash.

May 8-13: Mechanical Contractors Assn. of America Meeting, Kansas City, Mo.

May 11: American Ordnance Assn. Meeting, Washington, D.C.

May 11: National Defense Transportation Assn. Meeting, Fort Eustis, Va.

May 15-18: Society of Plastic Engineers Meeting, Detroit, Mich.

May 16-18: 1967 National Telemetering Conference, San Francisco, Calif.

May 20: Armed Forces Day.

May 22-25: American Institute of Aeronautics and Astronautics Advanced Marine Vehicles Meeting, Norfolk, Va.

May 23-25: Armed Forces Communications-Electronics Assn. Meeting, Washington, D.C.

May 31-June 2: American Society for Quality Control Annual Convention, Chicago, Ill.

avy Establishes ategic Warfare Office

y of the Navy Paul H. announced the centraliza- l Navy strategic warfare within the Office of the Naval Operations.

he Office of Director for Offensive and Defensive OP-97), the new office will erall guidance and coordi- planning, development and e Navy's growing strategic

niral George H. Miller has ated director of the office. port to the Vice Chief of erations. Admiral Miller erving as Director of the ge Objectives Group and of the Strategic Systems oup in the Office of the aval Operations.

Navy Shipbuilding Program for Fiscal Year 1967 Announced

The Navy has announced its ship-building program for FY 1967 allocating construction primarily to private shipyards. The nine naval shipyards are heavily committed, particularly in the repair and conversion of complex combatant ships. However, the San Francisco Bay Naval Shipyard will construct one decontamination barge (YFN) and one nuclear-powered attack submarine (SS(N)), and the Portsmouth, N.H., Naval Shipyard will build one decontamination barge.

Construction of the following ships in the FY 1967 Shipbuilding Program will be undertaken in private yards following competitive bidding (DE's and LST's already assigned as noted):

1 nuclear-powered attack aircraft carrier (CVA(N))
5 nuclear-powered attack submarines (SS(N))
1 nuclear-powered guided missile frigate (DLG(N))
1 dock landing ship (LSD)
11 tank landing ships (LST) (National Steel & Shipbuilding Corp., San Diego, Calif.)
10 escort ships (DE) (Avondale Shipyards, Westwego, La.)
5 ocean minesweepers (MSO)
2 ammunition ships (AE)
1 combat store ship (AFS)
2 replenishment fleet oilers (AOR)
1 submarine rescue vessel (ASR)
2 salvage tugs (ATS)
1 oceanographic research ship (AGOR)
2 surveying ships, medium (AGS)
311 miscellaneous landing and service craft

The nuclear-powered attack carrier in the program will be an improved version of the USS Enterprise (CVA (N)-65) and the most modern warship in the world. She will be powered with the new two-reactor plant that has been under development by the Atomic Energy Commission. The new carrier will have an overall length of 1,092 feet, a waterline beam of 134 feet, and a full-load displacement of about 91,300 tons. The ship's mission will be to support and operate aircraft to engage in sustained operations in support of other forces.

The nuclear-powered attack submarines in the program are the same class as those included in the FY 1966 Shipbuilding Program. These submarines are designed for maximum effectiveness against all types of ships, particular enemy submarines. They will have a high submerged speed and long-range sonar detection equipment. They will be equipped with antisubmarine warfare weapons such as antisubmarine rockets (SUBROC). They will have an overall length of about 300 feet, a maximum beam of 32 feet, and a full-load displacement of about 4,650 tons.

The guided missile frigate will be equipped with Tartar missile capability which will enable the ship to operate offensively, independently, or with strike, antisubmarine, or amphibious forces against submarine, air and surface threats. The ship will be 596 feet long, have a maximum beam of 60 feet, and a full-load displacement of 10,100 tons.

The 313 miscellaneous landing and service craft in the program include barges, lighters, and various landing craft of all sizes whose combined functions consist of landing personnel, vehicles and equipment from ship to shore.

Project ARISTOTLE

by

Eugene T. Ferraro

Dep. Under Secretary of the Air Force (Manpower)

Readers of the *Defense Industry Bulletin* during the last year are aware of the increased interest of the Defense Department in applying new education and training technologies to its education and training program. In the April issue of the *Bulletin*, the Assistant Secretary of Defense (Manpower) announced the Engineering Systems for Education and Training Conference held in June 1966 for the emerging educational technology industry. Over 500 representatives of industry attended the conference and many who did not are familiar with the proceedings of this endeavor to describe the magnitude and scope of DOD training programs as well as point out priority areas.

Following the conference, in the July issue, Roy Davenport, then Deputy Assistant Secretary of Defense for Manpower, Planning and Research, highlighted the key discussions of the conference and again emphasized DOD's strong intentions to pursue this program.

Finally, in an article published in the October issue, I described the Air Force's participation in this effort. That article mentioned a "follow-up" being planned by the National Security Industrial Association (NSIA) which co-sponsored the June conference with the Defense Department. The follow-up is known as Project ARISTOTLE (Annual Review of Information and Symposium on the Technology of Training and Learning and Education). I have been assigned DOD executive agency responsibility for Project ARISTOTLE.

The NSIA Training Advisory Committee, headed by Marvin Kuhn, Vice President, Aircraft Armaments, Inc., has taken the initiative to organize creative industrialists, educators and interested parties in the direction of Project ARISTOTLE.* Over 200 representatives of these organizations have volunteered their services to study the potential applications of new training technology to DOD education and training programs.

What is Project ARISTOTLE?

ARISTOTLE is an appropriate acronym for this large effort to assist the Defense Department in applying a systematic approach to its education and training problems. The scientific approach to method, the predecessor of the 20th century "systems approach," can be traced back to this Greek philosopher.

Project ARISTOTLE will attempt to "provide a structure to encourage continuing communication and exchange of accomplishments within the Government/industry education community and contribute to the advancement of quality and efficiency of the nation's education and training." NSIA has accepted the task of pulling together creative and imaginative people who have volunteered to study various problem areas and make recommendations to the Secretary of Defense, as well as to the Office of Education and other Federal agencies with whom they are working.

Several points about ARISTOTLE merit specific comment. First, it is a working project made up of voluntary representatives from universities and education associations. Second, its studies and recommendations have short- as well as long-term potentials. Third, although DOD took the initiative, other Federal agencies, such as the Office of Education, will be working closely with the task groups. Fourth, while other groups (e.g., the Committee for Economic Development, American Management Association, etc.) are concerned with various aspects of the Government-industry-education area, ARISTOTLE is the first and largest concerted effort by industrialists and educators to work with Federal agencies to study the new problems which impede the application of advanced technologies and management concepts to education and training.

The overall significance of ARISTOTLE is that it will be tackling some of the thorny and difficult problems confronting both industry and the Federal Government as we attempt to apply new teaching technology to DOD education and training.

NSIA task groups are presently studying particular priority and problem areas in which industry, as well as the education community, feels it can contribute new and forward looking recommendations for solutions to some of the old education and training problems. The task forces are listed below:

- Project 100,000.
- Media.
- Information Storage and Retrieval.
- Education Research.
- New Developments.
- Systems Analysis in Education.
- Standards, Measures and Evaluation.
- Courses, Skills and Tasks.
- Government Industry Interface.
- International Considerations.

Project 100,000.

"Project 100,000," initiated by the Secretary of Defense last August, will have taken into the Military Services by October 1967 about 40,000 individuals who normally would have been rejected because of mental aptitude or physical reasons. During the following 12 months about 100,000 of these young men will be accepted. It is felt that new training techniques, many developed by industry, have great potential for providing these young men the opportunity to realize their capabilities and, thereby, contribute to the effectiveness of our fighting forces. Existing screening techniques, which do not consider these new training methods, may be inadequate predictors of "trainability." Industrialists who have conducted "in-house" or other training programs like the Job Corps can assist us by sharing their experiences. Many of the techniques developed and tested in these programs, as well as other novel techniques awaiting demonstration of their merit, could be used in the pilot programs of Project 100,000.

Media, Developments and Standards.

The task groups concerned with "media," "new developments," and "standards and measurements" will certainly overlap each other. Although this in itself might be healthy, the

* *NSIA contact for additional information on Project ARISTOTLE is: Robert Walsh, Executive Secretary, Training Advisory Committee, National Security Industrial Association, 1030 15th Street NW, Washington, D. C. 20005, Telephone: (202) 296-9936.*

industrial interest in each of these areas appears to be so great that NSIA thought it advisable to have three individual groups. The problems in these areas are interrelated.

The problem with the use of existing media, such as educational television, closed-circuit television and films, is not that they aren't technically feasible but, rather, that they have generally been used ineffectively. The Killian Report on the use of television supports this contention. The question is really concerned with quality control over operation and curriculum development.

The "new developments" group is confronted with another question: Where can we find "laboratory-type" training operations which enhance experimentation on the effectiveness of new technology, such as computer-assisted instruction?

There is also the question of measurements. Industry, it may be presumed, is producing a new technology on the assumption that, if it is more efficient than existing techniques, the market will be created. Yet the market to which it is selling is too often not geared towards efficiency because the criteria for measuring output (i.e., how well the learner learns) do not exist in many cases. Without these criteria the present method of decision making, based often on costs of inputs (teachers, teaching machines, etc.) without regard to effectiveness, will foreclose feasible alternatives which utilize advanced and costly technology. Education is not an "industry" based on quality control criteria in which the managers consider "rejects" as costs of operations.

Systems Analysis and Instructional Systems.

The task groups studying "systems analysis" and "courses, skills, and tasks" are related but are directed at different problems. Systems analysis is a management technique for presenting alternatives to decision makers in all facets of education and training including directly related support activities such as research and development. It has to be separated from the "instructional systems approach" which is a methodology concerned with the tasks and skill requirements related to a particular course or cluster of courses. Both need to be thoroughly defined, and areas where each may be used effectively must be determined.

Education Research.

Education research is a topic in which Government agencies, especially the Office of Education (OE), are interested. Recently, the OE authority was changed by legislation so that industry could perform research within its $100-million-a-year research program. The problem today in education research appears to be more the question of quality rather than quantity. In 1963 there were about 1,500 "hard core" researchers who contributed to the solution of education problems. In 1966, this number jumped to 6,000. However, like the growth of "scientists" and "engineers" in the defense research and development buildup during the 1950's, the increase in dollars through the legislation, the Elementary and Secondary Education Act, enticed many less qualified individuals into the area. Alongside the problem of qualified researchers is the problem of qualified project managers over research undertakings. These individuals have not been spawned by universities because of the previous use by sponsoring Federal agencies of the grant rather than the contract system. There is also the problem of peer acceptance of the manager among his fellow researchers. Since the management capability appears to be strongest in industry, as industry increases its share as a performer, we will have to find some equitable way of insuring disclosure of privately financed and Federal research results which could lead to the improvement of education and training programs. Procedures to insure quality research appear to be as important as the question of qualified performers.

Government/Industry Interface.

The group of individuals studying the "Government/industry interface" problem in education is confronted with a multiplicity of problems and is faced with the necessity of establishing priorities. The emerging education industry appears to be following a pattern similar to that evolution of the defense industry in the late 1940's and early 1950's. Education research efforts are being discussed; the contract system and its management technique are beginning to be used by several Federal agencies.

Four areas which need to be studied certainly deserve priority attention. First, Federal dollars for education affect the decisions of both the producers and the consumers of industry's services and new technologies. Therefore, there is a need for direct communication between Government agencies at all levels and industry. Second, institutional mechanisms must be developed to create atmospheres conducive to "field testing" and evaluation of new technologies and the concurrent development of performance-based standards which will encourage further innovation. Third, Federal agencies and/or local school systems must develop methods to assure that industry's capabilities are used effectively. Fourth, there is the question of cost-sharing arrangements between the sponsoring agencies and the performers for educational "hardware" and "software." This question certainly raises the thorny issue of patents and copyrights.

National Benefits.

In this article an attempt has been made to point out the difficult problems which will be studied. ARISTOTLE will not be playing an "ostrich game!" Even though representation might appear to be top heavy with "defense" membership, either from DOD or defense industry, the orientation will be more general. The defense-oriented base will merely provide the foundation from which we can generalize the feasibility of applying many of the techniques and experiences of the DOD-industry partnership to our national education and training problems.

As the Defense Department, in its own training and education programs, continues and expands its use of new technologies, the effectiveness of our fighting forces will be improved. At the same time "guided" spin-off through Project ARISTOTLE will benefit the nation as a whole.

Navy Oceanographer Relocates

The Oceanographer of the Navy, Rear Admiral O. D. Waters Jr., and his staff have relocated from Suitland, Md. to Alexandria, Va.

OCEANAV NOTICE 5430 of Jan. 23, 1967, advises that, effective Feb. 15, 1967, correspondence to the Oceanographer of the Navy will be addressed as follows:

Oceanographer of the Navy
The Madison Building
732 N. Washington St.
Alexandria, Va. 22314

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Washington, D.C. 20402

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Defense Documentation Center
Cameron Station
Alexandria, Va. 22314
Others may purchase these documents at the price indicated from:
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Management Systems Control

by

Col. Albert W. Buesking, USAF

These last few months have witnessed the merging of what initially were two independent efforts carried on by Government and industry, each with a common objective: to cope with the increasing proliferation of divergent, and frequently incompatible, management systems used for planning, controlling, monitoring and auditing management activities.

The deep concern of industry was explicitly outlined in the findings of a year-long study conducted by a Systems Management Analysis Group (SMAG) of the Aerospace Industries Association, which was submitted to DOD's top management on May 12, 1966. The primary theme of the SMAG report was, "We (industry) find that the greatly increasing number of management systems of all kinds emanating from different functional arms of DOD and the Services, in a variety of forms, from a variety of sources and in a variety of time phasing, often coming in through different doors of industry, have an interrelationship with a cumulative effect which is adverse to the mutual objectives of Government and Industry."

Other key points highlighted in the report were: the problem of conflicts between management systems; the need for mating appropriate systems with the nature of the acquisition; the need to tailor the degree of management to the complexity of the program involved; and the need for careful examination of each new management system before its adoption to assure its consistency with other systems, to assure its consistency with the overall body of DOD policy, and to assure that the new system is—in fact—worthwhile when considered in light of the expense involved in its application.

At about the same time that industry was preparing its report, the Office of the Secretary of Defense was voicing its concern with the same problem. In a speech delivered March 3, 1966, Robert N. Anthony, Assistant Secretary of Defense (Comptroller), remarked as follows: "During the last decade, the Military Departments have developed and produced a wide variety of weapon and support systems, and they have also designed a wide variety of management systems for dealing with these major acquisitions. Each manager has separately wrestled with the problem of devising a system for describing plans, for measuring and controlling progress against those plans, and for recording experience so that the estimating and management job could be done better the next time. The result has been a proliferation of systems, reports and acronyms."

One of the prime reasons for this proliferation was an organizational fact of life in DOD. Each functional office and each Military Department has well defined duties and responsibilities to fulfill as outlined in various statutes, regulations and directives. Naturally, all are deeply concerned with seeing to it that these responsibilities and duties are fulfilled as efficiently and effectively as possible. From our point of view as taxpayers, we would not have it any other way.

This concern by the functional offices and the Services for the proper discharge of their assigned tasks was manifested in a number of different ways. One of these manifestations was a tendency by the Government manager to require detailed management procedures, many of which duplicated existing requirements thus spawning a seemingly endless number of reports and information systems.

Col. Albert W. Buesking, USAF, is Dir. of Management Systems Control in the Office of the Asst. Secretary of Defense (Comptroller). Prior to his assignment to this position, he held a position in the Minuteman System Program Office in which he was responsible for financial management, and planning and programming tasks. He holds a Bachelor of Science degree from Butler University and the Master of Business Administration degree from the Harvard Graduate School of Business.

To say that these requirements were placed on industry deliberately to constrain contractors and to create a paperwork burden completely misses the point. The intent, pure and simple, was to provide Defense managers with the tools and data to do the job that had been assigned to them in a way that we, as taxpayers, would expect any public figure to function as a guardian of public funds.

I mentioned that one of the prime reasons for this systems proliferation was an organizational fact of life in DOD. Simply put, there was no central coordinating responsibility for management systems. That is, there wasn't any until last August when DOD Directive 7000.1 on Resource Management Systems was published.

That directive covers Resource Management Systems, both internal and external to the DOD. The part which is of particular significance to us is Section VI, Responsibilities:

"A. Subject to the direction, authority, and control of the Secretary of Defense, Assistant Secretary of Defense (Comptroller) has the responsibility to provide for the design and installation of resource management systems throughout the Department of Defense.

"B. This responsibility requires that the Assistant Secretary of Defense (Comptroller):

"1. Maintain an overview of all DOD resource management systems activity, including an inventory of all significant DOD resource management systems, that are either in use or under development.

"2. Review and approve proposed significant changes in resource management systems or proposed new systems.

"3. Insure compatibility and uniformity among resource management systems.

"4. Provide policy guidance for the characteristics of and general criteria governing resource management systems.

"5. Insure standardization of data elements and data codes.

"6. Under certain circumstances, as described below, develop new systems or improvements in existing systems."

The criteria to be used in evaluating systems for management of capital acquisitions will:

"A. Focus on the item (or component thereof) being acquired, its quality, its time schedule and its cost in terms of both plans and actuals.

"B. Include special information subsystems applicable to acquisition of selected major capital items.

"C. Be standardized and controlled, to the extent practicable, so as to minimize the data gathering and reporting workload imposed on contractors and in-house activities.

"D. Be structured so as to minimize changes required to accounting systems used by contractors."

The directive, then, has provided the clear-cut definition of responsibility required to remedy the organizational condition that was a prime contributor to the management systems problem as it exists today.

It was only natural that a problem of this magnitude, recognized by both DOD and industry, was deserving of serious and coordinated attention by all those concerned. Indeed the wheels of cooperative effort were set in motion when Deputy Secretary of Defense Cyrus Vance in mid-1966 welcomed industry's offer to assist the DOD in resolving this significant and serious problem and, as he subsequently wrote in the October issue of *Armed Forces Management*, to look ". . . for ways to gain greater uniformity of acquisitions of major weapon systems. Our objective here is to simplify and obtain the minimum necessary information required to do our job properly."

Because the issues involved pertained to a broad segment of American industrial activity, the National Aeronautics and Space Administration (NASA) and the Council of Defense and Space Industry Associations (CODSIA) were invited to participate with DOD in the development of a course of action to deal with the problem.

At a meeting between DOD, NASA and CODSIA representatives Oct. 4, 1966, in the office of Assistant Secretary of Defense Anthony, agreement between all parties was quickly reached and preliminary steps were taken to formalize the task as a combined DOD-NASA-CODSIA effort. This is a progress report highlighting the results of that initial meeting and outlining the plans and objectives for moving ahead.

There was ready agreement among the participants with regard to the work to be done. The combined effort of the group would be directed toward achieving balance, compatibility, simplicity, and an adequate measure of uniformity among the multitude of management systems and subsystems already in existence and under development. Put another way, the objective would be to eliminate redundancies and duplication and insure compatibility between existing and proposed management systems.

The conduct of this effort will be governed by a few basic precepts:

- Impose no detailed systems on contractors. Rather, DOD will determine the general criteria which an acceptable system must satisfy; any system which will satisfy these criteria can be used to generate the required information.
- Regulate data demands on contractors. The intent, pure and simple, is to reduce markedly the volume, variety and number of management-type reports.
- Make maximum use of effective contractor management systems, but insure that data are credible and timely.
- Recognize that data requirements differ at various management levels. In particular, limit the flow of data up through the organizational hierarchy to that needed for the carrying out of top management responsibilities.
- Minimize mandatory features of information systems, leaving room for and encouraging effective innovation and progress.
- Recognize the paramount interests of the first-line manager, i.e., the project manager.
- Insure that the application and implementation of management systems are carried out in accordance with prescribed policies.

Working with these guidelines and objectives in mind, representatives of DOD, NASA and CODSIA are well on the way toward developing a recommended course of action. As of this time a number of preliminary steps have been completed.

Each participating group—DOD, NASA (NASA has elected to participate as official observer) and CODSIA—has developed and received approval of a charter outlining the purpose, function, responsibilities and method of operation. Each of these charters is compatible with its respective organization's rules and regulations, i.e., by-laws of CODSIA and DOD directives. Together, the three participating organizations compose the DOD-Industry Advisory Committee for Management Systems Control which has been officially approved.

In anticipation of the first meeting of the joint committee, DOD, NASA and CODSIA representatives had developed a proposed plan or approach for the conduct of the effort including a schedule and list of expected end products. This plan was reviewed by the full committee on Dec. 21, 1966, in Washington, D.C.

As a result of that initial joint meeting, the plan that was agreed upon can be summarized as follows. First, the entire effort divides into three distinct phases:

- Phase I covers the initial planning and ends with the approval of the plan. This approval was received Jan. 13, 1967.
- Phase II involves the need-use analysis of selected management systems, the development of general principles of procedure, and the preparation of DOD directives for formalizing the procedures.
- Phase III will be the actual implementation by DOD of the principles and procedures developed in Phase II.

These three phases are expected to require less than two years to complete, with the first two phases targeted for completion in one year.

A partial list of the expected end products of the effort of the committee includes:

- **Management Objectives**—A statement outlining the purposes to be served in the development and use of management systems in the acquisition process, i.e., the basic responsibilities of the Government manager and the way the management system aids in the fulfillment of those responsibilities.

(Continued on page 33)

U.S. - U.K. Logistics Cooperation

by

Michael G. Macdonald
Acting Dir., U.K. Negotiations/Weapons Planning
Office of Asst. Secretary of Defense (International Security Affairs)

In order to help meet its planned investment and consumption goals as well as to erase its balance-of-payments deficit, the Labour Government of the United Kingdom (U.K.) in its 1966 Defence Review set a goal of bringing down British defense expenditures to a level of six percent of the Gross National Product, or about $5.6 billion in 1964 prices by 1969–1970. This goal meant that the British government had to find ways to reduce defense expenditures by about $1.1 billion, or 16 percent of the level of expenditures planned by the previous government. To help achieve this end, the British government closely examined a number of major on-going weapons projects and identified three aircraft development programs for which cancellation and replacement by aircraft procurement programs promised a budgetary saving of about $1.5 billion.

The government's decision to cancel the TSR-2, P-1154 and HS-681 programs and to procure substantial quantities of C-130, F-4 and F-111 aircraft from the United States marks the real beginning of major logistic cooperation between the United States and the United Kingdom.

The two aircraft arrangements—formally called Cooperative Logistics Arrangements—covering the sale of over 60 C-130 Hercules transports, over 200 F-4 Phantoms for the Royal Air Force and the Royal Navy, and 50 F-111 aircraft, committed the United Kingdom to foreign exchange expenditures in the United States of about $2 billion.

A significant aspect of the cooperative logistics arrangements negotiated between the United States and Britain is the willingness by the United States to accept that a portion of the cost of the purchase by the United Kingdom should be returned to the United Kingdom through such devices as:

- DOD competitive procurement in the United Kingdom.
- Cooperative arms arrangements with third countries.
- Cooperative co-production.

Whatever the particular means or mix of means selected, the essential point is that these arrangements underscore, in a particular way, the "two-way street" of selling and buying which the U.S. military sales program is increasingly beginning to assume.

DOD is carrying out its willingness to cooperate with the United Kingdom to help minimize the foreign exchange impact of the aircraft procurement through cooperative co-production and competitive procurement.

Cooperative Co-production.

Arrangements have been made with U.S. prime contractors under which U.K. aerospace firms can bid for components required for the production in the United States of the aircraft bought by the British. The British content in these aircraft, of course, significantly reduces the foreign exchange cost of the aircraft.

The importance of this element can be seen from the current status of the C-130 Hercules, the F-4 Phantom and F-111 cooperative production programs. In the case of the C-130 program, British avionics in an amount of about $250,000 per aircraft and other British content of about $55,000 for fuselage panels and radomes will come from British firms. This means that for a total program cost of about $200 million, nearly $21 million, or 10 percent, of the program is British. The C-130 program has tighter delivery schedules and a smaller quantity of aircraft than the F-4 and, consequently, the British content is less than for the F-4.

Aside from the approximate $95 million special development cost to convert the F-4 to the F-4K (for the Royal Navy) and F-4M (for the Royal Air Force) configurations spent in the United States, something more than $120 million for avionics in this program will be produced in the United Kingdom—notwithstanding the fact that the aircraft are being assembled in the United States. In addition, another $200 million reflecting expenditure by the British for Rolls Royce Spey engines brings the total of U.K. content up to about 46 percent of the program. With the British content as large as it is in this program, extensive cooperation between our two governments and between U.S. and British industrial firms is required. License arrangements for production of more than 40 separate components have been set up, and it is estimated that about $120 million in British production will result from the British purchase of F-4 aircraft.

As far as the F-111 is concerned, only about five percent of the U.K. program, or about $25 million, will be British content. It was hoped, initially that perhaps one-eighth of the content of this highly sophisticated and complex aircraft could be United Kingdom. It turned out, however, that anything much greater than five percent could not be realized without introducing uneconomic production costs. Eight major U.S. subcontractors have made affiliations with British firms for the F-111 program.

Competitive Procurement.

As a direct outcome of the sale of F-111 aircraft to the British, DOD undertook to search out and select items of defense equipment and supplies competitively obtainable from U.K. sources, and to invite bids from British firms for such selected items. The United States agreed to establish an offset target of $325 million for direct DOD competitive procurement from U.K. sources and to assist the United Kingdom to sell $400 million of British equipment to other countries. In the implementation of its agreement to procure competitively, over the next 10 years, $325 million of defense supplies and equipment, British firms will be able to compete equally with U.S. firms for those items selected since British bids will be evaluated without imposing any differential under the Buy American Act or the DOD balance of payments program.

To date, the United States has committed purchases from the United Kingdom under the F-111 offset program of about $152 million, composed as follows:

- Two ocean-going survey ships for $16.73 million.
- One harbor tug for $7.35 million.

Rolls Royce Spey engines for the ' for $100 million.

Subcontracts in the amount of million and miscellaneous pur- ses amounting to $10 million.

ı its search for items that would t U.S. requirements and also fit ı British production availability,) has reviewed more than 200 items :ed by the British. Most of these s have not been accepted because · do not meet our specifications. ajor item still under review is the ish HS–125 aircraft—a competitor ll a possible USAF mission sup- requirement. Many other possi- items are in various stages of ideration.

is important to keep in mind the F–111 offset arrangement ılates three basic conditions:

The items procured must fully fy DOD requirements for per- ance, quality and delivery.

They must not cost DOD any than comparable items from sources.

All exceptions from the Buy rican and balance-of-payments ictions are made by the Secretary efense on a "case-by-case" basis. us, although no "across-the- l" exception is intended, every ; to afford British firms an oppor- y to compete on an equal footing U.S. firms is made. Naturally, are difficulties in trying to in- that British firms enjoy as equal ıpetitive situation with our firms ·ssible. Among the practical dif- :es confronting the British firms, xample, is the time factor in- l in the transmission of bid ges and bids between the United s and England, particularly for fied bids.

aforementioned programs in- ıg a British buy of U.S. military nent offer advantages to both Jnited States and Britain. For nited States, the sale of major of military equipment helps not our own balance-of-payments :m, but contributes toward the ment of other important policy ives such as to increase stand- tion and commonality of free military systems and equip- . and to provide friendly foreign s with an opportunity to acquire st possible weaponry at an eco- price. For the British, the ad- ;e is essentially economic in that 3R–2 program alone would have cost more than $2 billion or nearly the cost of the total three aircraft programs. From the military viewpoint, the cooperative logistics arrangements have permitted the British to retain, within their limit of a two-billion pound defence budget projected for 1970, many of their world-wide defense commitments. But the greatest long-run benefit to the United Kingdom probably will stem from the new climate of logistics cooperation which permits British industry an opportunity to compete effectively with our industry for selected defense contracts and to establish reputations for quality and performance.

Army Evaluates New High Speed Teleprinters

Two new types of teleprinters which can produce messages received over radio or wire circuits at speeds up to 2,400 words a minute, 24 times faster than equipment now used, are being evaluated by the Army Electronics Command, Fort Monmouth, N.J.

The machines were developed under separate contracts by the National Cash Register Co. of Dayton, Ohio, and the Radio Corporation of America, Princeton, N.J.

The NCR version employs a thermal process while the RCA printer operates by a pressure method.

The thermal or heat printer, having no moving parts except those which adjust the paper, can be dial set for speeds of 600, 1,200, or 2,400 words a minute. At the highest of the settings, the printer produces three 80-character lines a second—one character at a time. By adding multiple electronic circuits, it can operate at 32,000 words a minute by printing all 80 characters in a line simultaneously for use with high-speed computer systems.

During the thermal process, a heat sensitive master paper is held against the stationary print heads. The sensitized image on the master paper is transferred to plain paper to produce the original text. Six or more high-quality copies can be made.

The pressure-type printer, which also employs a non-impact technique, forms characters through the use of seven horizontal printing bars and a small rolling pin.

When the rolling pin passes under the bars, they apply pressure against carbon paper which impresses the characters on standard paper. The machine prints 600 to 1,200 words a minute and produces six copies simultaneously.

USAF Scientists Develop New High Temperature Ceramic Coating

A new ceramic material promising excellent thermal protection for the outer surfaces of aircraft and space vehicles has been developed by scientists at the Air Force Materials Laboratory, Wright-Patterson AFB, Ohio.

Project engineers at the laboratory, a part of the Air Force Systems Command's Research and Technology Division, describe the white, translucent material called "Zircolite" as the best ceramic of its type ever developed for high temperature applications.

The polycrystalline, refractory zirconium oxide ceramic withstands 4,500 degrees Fahrenheit and has been tested continuously for 260 hours at 4,000 degrees Fahrenheit in the laboratory without measurable deterioration or atmospheric erosion. No other refractory oxide remains as stable and unreactive under such severe thermal conditions.

Zircolite also has very high density, strength and corrosion resistance characteristics that could make it useful to the Air Force as a coating for nose cones, rocket nozzles and other high temperature surfaces on missiles and spacecraft.

The new ceramic is made from a fine-particle, high-purity zirconium oxide powder, pressed at room temperature, then fired for short periods at 2,600 degrees Fahrenheit in a tube furnace having an oxidizing atmosphere. The ultra-high purity of the finished material gives it superior translucent properties. Ground to one-eighth inch or less, it is glass-like and transmits enough light to make legible printed material placed beneath it. This property gives it a potential application in high temperature elements for electric lamps. It could also be used for infrared and other electromagnetic radiation windows.

A unique method of chemically decomposing metal-organic compounds of zirconium produces the powder base for Zircolite. The reaction occurs in a complex glass decomposition chamber designed for the process by scientists. They also synthesized, for the first time, transition and rare-earth metal compounds used to make the new ceramic.

USAF Sole Manager of Liquid Propellants

The U.S. Air Force has been designated sole manager of liquid propellants for both the Air Force and the National Aeronautics and Space Administration.

Responsibility for the management of the $75 million annual space fuel operation has been assigned to Air Force Logistics Commands' San Antonio Air Materiel Area, (SAAMA) Kelly AFB, Tex.

DNL/DLP— A Focal Point for Laboratory Management

by
D. C. Hughes

The Secretary of Defense has often stated as a matter of policy the need for competent and creative in-house technical laboratories within the Defense Department. Among the evident reasons underlying this need are:

- The maintenance of a national competence during peacetime, as well as during periods of conflict, in those areas of technology peculiar to the needs of national defense.
- The necessity for maintaining a continuity of effort directed toward the conception and evolution of advanced weapon systems.

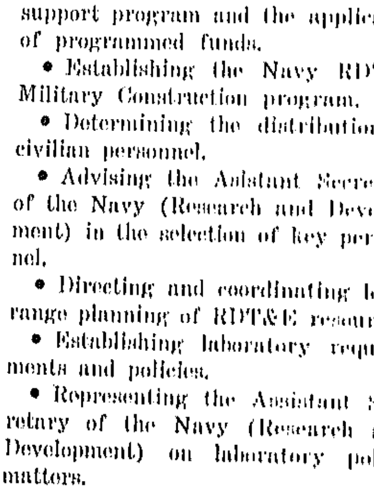
The Navy laboratories represent the primary technical strength of the Navy and must play an ever increasing role in the assessment of threats and in the development of systems to meet them. In addition, the Navy requires a competent in-house capability which can monitor and assess the accomplishments of contractors, and a fast reaction capability to solve critical, immediate problems of the operating forces.

As a consequence of recognition of the requirement for a focus of special management attention for the total Navy Research Development, Test and Evaluation (RDT&E) field complex, the Office of Navy Laboratories (DNL) was created at the Departmental level with Dr. Gerald W. Johnson as director. DNL functions as one of the principal advisors to the Assistant Secretary of the Navy (Research and Development) coequal with the Deputy Chief of Naval Operations (Development), the Marine Corps Deputy Chief of Staff (Research & Development), the Chief of Naval Development, and the Chief of Naval Research.

The official charter of the Director of Navy Laboratories charges him, within the Navy-wide RDT&E field complex, with responsibility for:

- Control of the in-house exploratory development technical program and the application of programmed funds.
- Assuring optimum responsiveness of the Navy RDT&E field activities to the program-sponsoring bureaus, offices and project managers.
- Guiding the in-house laboratory independent research (Foundational Research) and Independent Exploratory Development (FR/IED) programs and controlling the application of programmed funds.
- Controlling the management and support program and the application of programmed funds.
- Establishing the Navy RDT&E Military Construction program.
- Determining the distribution of civilian personnel.
- Advising the Assistant Secretary of the Navy (Research and Development) in the selection of key personnel.
- Directing and coordinating long-range planning of RDT&E resources.
- Establishing laboratory requirements and policies.
- Representing the Assistant Secretary of the Navy (Research and Development) on laboratory policy matters.
- Acting as Chairman of the Advisory Group to the Assistant Secretary of the Navy (Research and Development) on laboratory matters.

In addition, the DNL acts as the Director of Laboratory Programs



Mr. D. C. Hughes is Head of the Organization and Manpower Branch, Laboratories/Development Resources Div., under the Dep. Chief of Naval Material (Development). He has also held positions in the Laboratory Management Div., Noise Reduction Branch and the Mine Countermeasures Branch of the Bureau of Ships.

(DLP) in Naval Material Command headquarters. He is the special advisor to the Chief of Naval Material (CNM) on matters concerning management of the RDT&E field activities complex within the Naval Material Command (NMC) and, in this capacity, exercises executive authority as DLP working for CNM. The DLP office is located in the staff of the Deputy Chief of Naval Material (Development) DCNM(D), and derives much of its support from the Laboratories/Development Resources Division under DCNM(D).

The DNL maintains a close working relationship with the Chief of Naval Research and Chief of Naval Development to ensure that the FR/IED programs are properly considered in the review and appraisal of the research and exploratory development programs. Further, he works with and is supported by the Chief of Naval Development and the laboratory management offices of the bureaus and offices of the Navy Department in the fulfillment of his responsibilities. He informs the Chief of Naval Operations and the Commandant of the Marine Corps of those matters of laboratory management policies which may affect the capabilities of the RDT&E field complex in support of the operating forces.

To date, many of the actions taken by the DNL have had attention directed to the 15 laboratories which have been placed under the direct command of the Chief of Naval Material and which are supported by the Naval Material Command's systems commands. These RDT&E field activities have been selected because of their major involvement in new weapon systems development and in the support of weapon systems already operational within the fleet. The success of these systems is paramount to the effectiveness of the operating forces and the maintenance of the overall Navy defense posture. To fulfill their obligation to the fleet and further enhance their value in the systems area, the laboratories must not only be the producers of sciences

and technology but they must also be thoroughly alert to the present and future operational requirements of the fleet. The laboratories' job is to provide the most effective weaponry that men can operate in all the confusion and uncertainties that characterize the combat environment. To satisfy this requirement, it is mandatory that the laboratories also understand, draw on, and stimulate the basic technical strength of the nation wherever it may exist. Further, the laboratories must understand the operational problems of the fleet as it is affected by the capabilities and limitations of its men and its organization.

The present Navy RDT&E field activity complex has evolved over the past 60 years as the needs for increased capability in new technology and sciences have become evident. At the present time, this family has grown to include over 40 separate activities. These activities are under the command of various organizational entities within the Navy, i.e., Naval Material Command, Office of Naval Research, Bureau of Medicine and Surgery and the Bureau of Naval Personnel. Until the establishment of the office of the Director of Navy Laboratories, the individual offices and bureaus, as well as their RDT&E field activities, were in direct competition for the essentials to maintain the overall RDT&E capabilities within their jurisdiction. The most important of these essentials were, and still are, manpower, facilities and program support. The operating climate within the RDT&E community is now even more acute than in the past due to the ever increasing requirement for research investigation and new weapon development, basically within a relatively fixed resource capability. Under such constraints, a focal point for resources decision making is essential to afford an optimum utilization of the fixed resources in meeting the needs of the ultimate consumer.

In this context, the DNL and his staff provide such a focal point for a critical analysis of RDT&E resources distribution measured against Navy needs. The DNL will be able to assess total Navy needs for manpower, facilities and program support in consonance with the missions of the RDT&E field activities. Within the Naval Material Command, acting in the capacity of Director of Laboratory Programs, Dr. Johnson will be responsible for the management of the laboratories commanded by the Chief of Naval Material. In addition, he will coordinate the total research resources requirements for the Naval Material Command RDT&E field activities complex in the execution of the approved Navy RDT&E conducted within the complex. These coordinated requirements will provide the base of the Naval Material Command submittal to higher authority. This submittal, along with the similar research resource requirements developed by the Chief of Naval Research, the Chief of Bureau of Medicine and Surgery and the Chief of the Bureau of Naval Personnel, will provide the total research resource requirements of the Navy for total Navy-wide coordination and decision at the DNL level.

In the few months that the DNL has been in operation, a consolidated Navy input for RDT&E facility requirements has been developed for submittal through proper channels to the Military Construction Review Board (MCRB). These requirements are being consolidated with the Navy non-RDT&E facility requirements as a total Navy requirement for facility acquisition. The DNL will provide a single voice, strongly supported by the Assistant Secretary of the Navy (Research and Development), for further support of the research complex facility requirements as they move forward through the Director of Defense Research and Engineering and other reviewing elements within the DOD and above.

In the area of Navy personnel ceilings for the RDT&E field activity complex, the problem of providing a single voice at the DNL level for total Navy requirements needs much detailed planning and interface resolution between the many organizational elements involved. The many responsibilities for budget planning and justification cannot be redirected in a short time scale, since any disruption in these planning processes would create a chaotic condition within the RDT&E community. As the DNL concept becomes more thoroughly understood within the organization of the Navy, the interfaces will be resolved and the research community and the DNL staff will develop in stature to provide a coordinated input for Dr. Johnson. In the interim, the first steps in the ultimate process are being taken by means of DLP coordination of personnel ceiling and high grade job positions within the Naval Material Command field RDT&E complex. The reorganizations within the Navy, which involved the entire Naval Material Support Establishment (now Naval Material Command), the Office of Industrial Relations (now Office of Civilian Manpower Management), and the establishment of the position of Deputy Under Secretary of the Navy (Manpower), have created many new interface areas which must be resolved as former functions and responsibilities are now found in new offices. As in all reorganizations, a great many growing pains ensue as the new operational concepts begin to take hold. The DNL responsibilities for civilian personnel distribution become a part of this concept and will be developed to maturity, and in balance with the other elements involved.

The DNL, in order to increase the effectiveness of laboratory participation in planning of programs for the future, has formed a number of inter-laboratory working groups, each chaired by a member from one of the laboratories. These groups are directed to specific warfare areas of immediate concern and are intended to be standing groups separately funded to carry out their assigned function. Each group in its area of concern will have access to all necessary intelligence, and will work cooperatively with appropriate operational and analysis groups within the fleet and at headquarters. The broad charter of each group will permit them to critically assess existing warfare systems, equipment and techniques in their respective areas of interest; to relate the existing capabilities to those of potential enemies; to suggest improvement in present systems or new systems; and to define appropriate supporting research and development. The results of these efforts are directed toward providing rationale and direction for laboratory programs.

In conclusion, a gross simplification of the mission of the DNL can be stated as follows: "To insure the optimum development and utilization of the Navy's RDT&E resources in support of the approved programs." This simple statement has the deepest of implications in the execution of

the following goals of the DNL function:

- A thorough knowledge of the existing field RDT&E complex and its capabilities.
- A comprehensive plan for the Navy RDT&E field complex of the future (10–20 years) based on long-range planning documents and estimates of technological requirements.
- A progressively phased program for the orderly transition.

The DNL and his supporting staff are taking positive action to achieve these goals within a reasonable time frame and are enlisting the best available talent within the Navy to formulate the program plans which point to the future Navy research resource requirements. Upon the realization of these objectives and their periodic updating, a realistic implementation plan can be developed for the orderly transition, conditioned by the internal, external, political, economic and other controlling factors, which always impinge on the plans of Government organizations.

Navy Scientists Discover Sea Desert Off Catalina

A desert under the sea has been reported by Dr. Eugene C. LaFond of the U.S. Navy Electronics Laboratory (NEL) after two dives in the San Pedro Basin near Catalina Island, Calif., in Deepstar, a deep diving research vehicle.

The desert was discovered Dec. 4, 1966, when Dr. LaFond, head of NEL's Marine Environment Division, and Dale Good, Instrumentation Engineer, went to a depth of 3,000 feet in the three-man craft. Pilot of the craft was Bob Bradley, an employee of the Westinghouse Corp., designers of the craft.

Usually brittle stars or sable fish are seen on the bottom but the basin area was completely devoid of life according to Dr. LaFond. The only organisms seen in the desert were dead squid and flat fish.

Dr. LaFond said the basin bottom was covered with a carpet of organic material about a centimeter thick. There were no worm holes or evidence of any life.

Water samples taken during the exploration of the basin indicate there is ample oxygen to support marine life. Further analyses of water samples will be made to determine phosphate, nitrate and silicate properties.

Deepstar thoroughly traversed the basin three times. Seven hours were spent underwater during the mission.

Clearinghouse Adopts New Document Sales System

A new single price/coupon system for the sale of U.S. Government sponsored research and development reports has been adopted by the Department of Commerce Clearinghouse for Federal Scientific and Technical Information.

The document coupon is a tabulating card with a face value of the purchasing price of a Clearinghouse document. The coupon serves as the method of payment, order form and shipping label. Coupons for paper copies of documents sell at $3 each or a book of 10 coupons for $30. Coupons for microfiche copies will be sold in books of 50 coupons for $32.50. The coupons went on sale Feb. 16.

Efficiency in ordering and processing resulting from the new system have made it possible to reduce the price of documents. The new price applies to previously announced as well as new documents.

The new Clearinghouse pricing policy is a change from a sliding price scale based on document size to a single price for documents sold. The new document price for a paper copy (hard copy) is $3. Microfiche copies are priced at 65 cents for each document.

Certain reports, such as those available from the Superintendent of Documents, are priced as individually announced by the Clearinghouse rather than at the new single price. The single price does not apply to multiple copy orders of a single document. Quotations on quantity purchases of a single title are available on request.

New Electronic Control Center To Be Installed on Kwajalein Atoll

An electronic control center that will be the basis for a new antimissile radar program has been completed and will be shipped to the Kwajalein Atoll for installation on Roi Namur Island.

The equipment is part of Project ALTAIR, a Long Range Tracking and Instrumentation Radar program sponsored by the Advanced Research Projects Agency (ARPA).

Consisting of a computer complex and several display consoles, the control center will enable operators to maneuver and monitor the 150-foot-diameter radar antenna and to display tracking information such as range, altitude, speed and trajectory of targets.

Sylvania Electric Systems is developing the ALTAIR radar system under contract to the U.S. Army Missile Command, Redstone Arsenal, Ala. The Missile Command manages the program for ARPA, an agency of the Defense Department.

Security Briefings a Must for Paris Air Show

Contractors who are planning to participate in the Paris Air Show, May 28 to June 4, 1967, are reminded of the provisions of paragraphs 5t and 6a(13) of the Industrial Security Manual for Safeguarding Classified Information (Attachment to DD Form 441). Under the provisions of this manual, contractors must insure that their employees, who will participate in the show and the attendant technical meetings, are given a briefing on the potential security hazards involved. Such briefings should be based on Appendix VII of the manual.

Prior to the foreign travel and upon completion of the travel, contractors must submit to their cognizant security office the reports required under paragraph 6a(13) of the manual.

Inspection System's Handbook Available

The Defense Department has published a new handbook, titled "Evaluation of a Contractor's Inspection System (H 51)," to provide guidance for the evaluation of contractors' inspection systems established in accordance with Military Specification MIL-I-45208A, "Inspection System Requirements."

The booklet is now being distributed throughout Government and industry and is also available for purchase from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20401, for 25 cents a copy.

Army Forms Agency To Direct Computer Processing

The Office of the Army Deputy Chief of Staff for Personnel has established an agency to centralize the direction and coordination of its automatic data processing system.

The new agency, called the Personnel Systems Directorate, will also be responsible for reports control and the clearance of selected personnel statistics, since these functions are closely associated with automated personnel systems products.

Brigadier General Lawrence H. Walker Jr., USA, formerly assigned as the Commanding General of the U.S. Army Data Support Command, has been designated as the Director of Personnel Systems.

The Personnel Systems Directorate, assisted by the Data Support Command and other agencies, will determine major areas for the application of automated systems, establish overall objectives, and assign priorities for the development of new personnel systems to support recognized needs.

MEETINGS AND SYMPOSIA

APRIL

Scientific and Technical Symposium and Contractors Counseling Service, April 4–6, Cleveland, Ohio. Sponsors: U.S. Navy, National Security Industrial Assn. and the City of Cleveland. Contact: Mr. Paul A. Newman, National Security Industrial Assn., Dept. N., Suite 800, 1030 15th St., N.W., Washington, D.C. 20005. (Area Code 202), 296 2266.

Biomechanic Symposium, April 5–6 at Augustana College, Rock Island, Ill. Sponsors: Army Research Office, Durham, N.C.; Army Weapons Command, Rock Island, Ill.; and Augustana College, Rock Island, Ill.

Conference on Polymer Structure and Mechanical Properties, April 19–21, at the U.S. Army Natick Laboratories, Natick, Mass. Sponsors: Army Natick Laboratories, Chief of Naval Research, Air Force Materials Laboratory, National Aeronautics and Space Administration, and the National Academy of Sciences. Contact: Malcolm C. Henry, Acting Associate Director, C&OM Div., Army Natick Laboratories, Natick, Mass. 01760, (Area Code 617) 653 1000, Ext. 430 or 642.

Annual Frequency Control Symposium, April 24–26, at the Shelburne Hotel, Atlantic City, N.J. Sponsor: U.S. Army Electronics Command. Contact: M. F. Timm (AMSEL-KL-SR), Electronic Components Laboratory, U.S. Army Electronics Command, Fort Monmouth, N.J. 07703, (Area Code 201) 535 2826 or 535 1728.

Physics of Superconducting Devices Symposium, April 28–29, at the University of Virginia, Charlottesville, Va. Sponsor: Office of Naval Research. Contact: Dr. Bascom S. Deaver, Chairman, Organizing Committee, Department of Physics, University of Virginia, Charlottesville, Va. 22904, (Area Code 703) 295 2166, Ext. 3128.

Annual Symposium in Applied Mathematics "Conference on Transport Theory," dates undetermined, New York, N.Y. Co-sponsors: U. S. Army Research Office, Durham, N.C., and Air Force Office of Scientific Research. Contacts: Dr. Francis G. Dressel, Mathematics Div., Army Research Office-Durham, Box CM, Duke Station, Durham, N.C. 27706, (Area Code 919) 286 2285, ext. 50; or Maj. John Jones Jr., (SRMA), Air Force Office of Scientific Research, 1400 Wilson Blvd., Arlington Va. 22209, (Area Code 202) OXford 4-5261.

MAY

Annual National Colloquium on Information Retrieval, May 3–4, at the Hotel Adelphia, Philadelphia, Pa. Contact: STINFO Project Director, A 2100, Frankford Arsenal, Philadelphia, Pa. 19137, (Area Code 215) JE 5-2900, Ext. 3219.

Sixth Rare Earth Conference, May 3–5, Gatlinburg, Tenn. Co-sponsors: Air Force Office of Scientific Research and Oak Ridge National Laboratory. Contact: Dr. Anthony J. Matuszko (SRC), Air Force Office of Scientific Research, 1400 Wilson Blvd., Arlington, Va. 22209, (Area Code 202) OXford 4-5337. Program details contact: Dr. W. C. Koehler, Solid State Div., Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, Tenn. 37831.

Conference on Expandable and Modular Structures for Aerospace Applications, May 15–17, at the Carillon Hotel, Miami Beach, Fla. Sponsors: Air Force Aero Propulsion Laboratory, Space General Corp. and GCA Viron Div. Contact: Fred W. Forbes (APFT), Air Force Aero Propulsion Laboratory, Wright-Patterson AFB, Ohio 45433, (Area Code 513) 253-7111, Ext. 52771.

Interagency Data Exchange Program (IDEP) Annual Conference, May 16–18, Clear Lake, Tex. Sponsor: Policy Board, IDEP. Contact: Army Representative, Policy Board, IDEP, Systems Research & Development Branch, S&TI Division, Army Research Office, Office of Chief of Research & Development, Washington, D.C. 20310, (Area Code 202) OXford 4-3513.

JUNE

Twelfth Science Seminar, June 7–14, at the Western Skies Motor Hotel, Albuquerque, N.M. Sponsor: Air Force Office of Scientific Research. Contact: David L. Arm, Director, AFOSR Science Seminar, 1400 Wilson Blvd., Arlington, Va. 22209, (Area Code 202) 694-4875.

Conference on High Energy Therapy Dosimetry, June 15–17, in New York, N.Y. Sponsor: Office of Naval Research. Contact: Eunice Thomas Miner, Executive Director, The New York Academy of Sciences, 2 East 63rd St., New York, N.Y. 10021.

Fundamental Physics of the Magnetosphere, date undetermined, at Boston, Mass. Co-sponsors: Air Force Cambridge Research Laboratories and Boston College. Contact: Dr. J. F. McClay (CRFG), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01731, (Area Code 617) 274-6100, Ext. 3218.

Management System Controls

(Continued from page 27)

• **Development Control Directive**—A document which will prescribe formal procedures and approval channels for the development of new or revisions to existing management systems. This will not restrict the development of those systems beneficial to the Government but will provide for an orderly development of new or revised systems to insure their need, compatibility and non-duplication with existing systems.

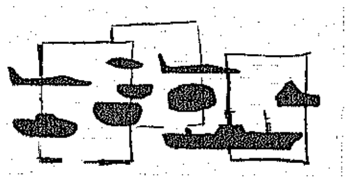
• **Application Control Directive**—A document which will prescribe formal procedures for the application of management systems on contracts. The purpose of this document will be to insure that the management systems selected are the appropriate ones given the nature of the acquisition, and that the purpose and intent of the system is carried through in the implementation stage.

• **Authorized System List**—A list of approved management systems for use in the acquisition process. This will be developed from an inventory of existing management systems prepared by the Management Systems Control Directorate in the Office of Assistant Secretary of Defense (Comptroller).

• **Glossary**—A dictionary of common terms used in management systems by Government and industry.

Supporting these end products is a detailed network identifying some 80 separate tasks that must be completed before these end products are achieved. These tasks will be staffed by people from each of the three participating groups and will require the better part of a full year's effort for completion. As of this writing, the first four task groups have already begun to work on their assigned tasks.

It is our intention to provide further progress reports on the conduct of this effort to encourage the support and suggestions of all interested parties.



DEFENSE PROCUREMENT

Contracts of $1,000,000 and over awarded during the month of February 1967:

DEFENSE SUPPLY AGENCY

1—The Defense Personnel Support Center, Philadelphia, Pa., has awarded the following contracts for men's wind-resistant cotton poplin trousers:
  Sidran Sportswear, Dallas, Tex. $2,889,600. 700,000 pairs.
  J. M. Wood Mfg. Co., Waco, Tex. $1,632,000. 400,000 pairs.
  Apparel Corp. of America, Knoxville, Tenn. $1,631,600. 440,000 pairs.
  Glenn Mfg. Co., Amory, Miss. $1,570,500. 450,000 pairs.
  Covington Industries, Opp, Ala. $1,047,000. 300,000 pairs.
—A. M. Ellis Hosiery Co., Philadelphia, Pa. $1,182,191. 1,451,320 pairs of men's cotton, wool and nylon socks. Defense Personnel Support Center, Philadelphia, Pa.
2—California Steel & Tube, Los Angeles, Calif. $2,773,950. 97,500 steel bunk beds. Defense General Supply Center, Richmond, Va.
—U.S. Bedding Co., St. Paul, Minn. $2,396,095. 96,500 steel bunk beds. Defense General Supply Center, Richmond, Va.
—Koehring Co., Milwaukee, Wis. $1,266,300. 30 crawler-mounted shovel cranes of ¾ cubic yard capacity. Defense Construction Supply Center, Columbus, Ohio.
3—J. P. Stevens & Co., New York, N.Y. $1,294,170. 537,000 yards of wool tropical cloth. Defense Personnel Support Center, Philadelphia, Pa.
—Burlington Industries, New York, N.Y. $1,547,150. 485,000 yards of wool serge cloth. Defense Personnel Support Center, Philadelphia, Pa.
6—U & W Mfg. Co., Selma, Ala. $2,475,685. 1,054,910 pairs of men's cotton trousers. Defense Personnel Support Center, Philadelphia, Pa.
—Winthrop Laboratories, New York, N.Y. $3,624,768. Various quantities of primaquine and chloroquine. Defense Personnel Support Center, Philadelphia, Pa.
—Knapp Monarch Co., St. Louis, Mo. $1,931,116. 73,000 insulated food containers. Defense General Supply Center, Richmond, Va.
—The Defense Fuel Supply Center, Alexandria, Va., has awarded the following contracts for JP-r jet fuel.
  Gulf Oil Corp., New York City, N.Y. $1,806,000. 16,800,000 gallons.
  Phillips Petroleum Co., Bartlesville, Okla. $1,611,345. 15,130,000 gallons.
  Coastal States Petrochemical Co., Houston, Tex. $1,580,250. 14,700,000 gallons.
  Sinclair Refining Co., New York, N.Y. $1,147,111. 10,771,000 gallons.
  Signal Oil & Gas Co., Houston, Tex. $1,015,875. 9,450,000 gallons.
—The Defense General Supply Center, Richmond, Va., has awarded the following contracts for sandbags:
  Cavalier Bag Co., Lumberton, N.C. $4,243,993. 17,660,000 osnaburg bags.
  Consolibag, Inc., Philadelphia, Pa. $3,863,175. 800,000 burlap and 15,260,000 osnaburg bags.
  Bemis Co., Minneapolis, Minn. $3,741,020. 650,000 burlap and 15,520,000 osnaburg bags.
  Continental Bag Co., Crowley, La. $1,853,025. 7,200,000 osnaburg bags.

CONTRACT LEGEND

Contract information is listed in the following sequence: Date—Company—Value—Material or Work to be Performed—Location Work Performed—Contracting Agency.

  Chase Bag Co., New York City, N.Y. $1,420,762. 5,128,000 osnaburg and 700,000 burlap bags.
  Augusta Bag & Burlap Co., Augusta, Ga. $1,408,100. 4,200,000 osnaburg bags.
7—Douglas Chemical Co., New York, N.Y. $1,162,720. 41,600 drums of frerric chloride. Defense General Supply Center, Richmond, Va.
8—The Defense Fuel Supply Center, Alexandria, Va., has awarded the following contracts for 115/145 aviation gas:
  Mobil Oil Corp., New York, N.Y. $10,833,451. 69,180,000 gallons.
  Humble Oil & Refining Co., Houston, Tex. $10,076,067. 69,737,600 gallons.
  Phillips Petroleum Co., Bartlesville, Okla. $9,718,803. 64,416,000 gallons.
  Cities Service Oil Co., New York, N.Y. $8,296,120. 58,800,000 gallons.
  Atlantic Richfield Co., Los Angeles, Calif. $7,717,063. 46,200,000 gallons.
  Tidewater Oil Co., New York, N.Y. $3,843,804. 26,000,000 gallons.
  Sinclair Refining Co., New York, N.Y. $3,627,540. 26,550,000 gallons.
  American Oil Co., Chicago, Ill. $2,832,644. 19,911,000 gallons.
  Continental Oil Co., Houston, Tex. $1,905,679. 12,681,900 gallons.
  Texas City Refining Co., Texas City, Tex. $1,270,500. 8,400,000 gallons.
  Shamrock Oil & Gas Corp., Amarillo, Tex. $1,089,540. 7,890,000 gallons.
10—Delta Petroleum Co., New Orleans, La. $4,560,313. 11,397,820 gallons of lubricating oil. Defense Fuel Supply Center, Alexandria, Va.
13—Burlington Industries, New York, N.Y. $4,133,160. 5,400,000 linear yards of wind resistant cotton combed cloth. Defense Personnel Support Center, Philadelphia, Pa.
14—Plant Industries, Inc., Plant City, Fla. $1,106,437. 54,288 cases of canned instant orange juice. Defense Personnel Support Center, Philadelphia, Pa.
—Koehring Co., Milwaukee, Wis. $1,350,720. 32 crawler-mounted crane shovels. Defense Construction Supply Center, Columbus, Ohio.
16—U.S. Steel, Washington, D.C. $1,376,487. 278,800 feet of shipboard electric cable. Defense Industrial Supply Center, Philadelphia, Pa.
—Marcie Dale Inc., Atlantic City, N.J. $1,188,900. 45,000 men's green wool serge coats with belts. Defense Personnel Support Center, Philadelphia, Pa.
17—Pettibone Mulliken Corp., Washington, D.C. $2,052,896. 303 electric fork lift trucks. Defense General Supply Center, Richmond, Va.
21—General Cable Corp., New York, N.Y. $1,148,642. 21,800 reels of telephone cable. Defense Industrial Supply Center, Philadelphia, Pa.
23—Glenberry Mfg., Inc., Commerce, Okla. $1,042,301. 931,320 pairs of men's cotton sateen trousers. Defense Personnel Support Center, Philadelphia, Pa.
—The Defense General Supply Center, Richmond, Va., has awarded the following contracts for osnaburg sandbags:
  Consolibag, Inc., Philadelphia, Pa. $1,912,500. 7,500,000 bags.
  Dowling Bag Co., Valdosta, Ga. $6,274,000. 26,000,000 bags.
  Continental Bag Co., Crowley, La. $1,343,310. 5,300,000 bags.
  Cavalier Bag Co., Lumberton, N.C. $1,859,400. 7,600,000 bags.
  Augusta Burlap Bag Co., Augusta, Ga. $1,477,000. 6,000,000 bags.
24—Rolane Sportswear, New York, N.Y. $1,347,430. 160,000 men's nylon-cotton sateen field coats. Defense Personnel Support Center, Philadelphia, Pa.
—Alpha Industries, Knoxville, Tenn. $1,339,800. 165,000 men's nylon-cotton field coats. Defense Personnel Support Center, Philadelphia, Pa.
—La Crosse Garment Mfg. Co., La Crosse, Wis. $3,899,300. 200,000 mountain-type sleeping bags. Defense Personnel Support Center, Philadelphia, Pa.
27—Standard Oil Co. of Calif., San Francisco, Calif. $2,535,054. 700,000 gallons of combat, Type II, automotive gasoline, and 18,252,000 gallons of grade DF-A Arctic diesel fuel. Defense Fuel Supply Center, Alexandria, Va.
—General Fire Extinguisher Corp., Northbrook, Ill. $2,449,603. 165,200 fire extinguishers. Defense Construction Supply Center, Columbus, Ohio.
—Land-O-Lakes Creameries, Minneapolis, Minn. $1,165,757. 3,650,400 pounds of nonfat dry milk. Defense Personnel Support Center, Philadelphia, Pa.
28—Crowley Industrial Bag Co., Crowley, La. $3,687,750. 15,000,000 osnaburg sandbags. Defense General Supply Center, Richmond, Va.

ARMY

1—Ford Motors, Highland Park, Mich. $4,151,515. ¼-ton trucks, including engine installation, Highland Park, General Purpose Vehicle Project Manager, Warren, Mich.
—Motorola, Inc., Scottsdale, Ariz. $1,500,000. Improved airborne radar surveillance sets. Scottsdale. Army Electronics Command, Fort Monmouth, N.J.
—Superior Scaffold Co., Torrance, Calif. $1,799,499. Steel water tank support towers. Torrance. Army Mobility Equipment Command, St. Louis, Mo.
—International Telephone & Telegraph Corp., Easton, Pa. $2,000,000. Image intensifier assemblies in connection with the Night Vision program. Roanoke, Va. Army Electronics Command, Fort Monmouth, N.J.
—Lockheed Aircraft, Sunnyvale, Calif. $1,665,105. Equipment and services in connection with underground nuclear testing at the Nevada Test Site. Sunnyvale, Calif., Seattle, Wash., and Nevada Test Site. Defense Atomic Support Agency, Washington, D.C.
2—Stevens Mfg. Co., Ebensburg, Pa. $1,098,004. 7½-ton refrigerator vans. Ebensburg. Army Tank Automotive Center, Warren, Mich.
—LTV Aerospace Corp., Warren Mich. $1,200,000. Production equipment in support of the Lance Missile Program. Sterling Township, Macomb County, Mich. Army Tank Automotive Center, Warren, Mich.
—International Harvester Co., Melrose Park, Ill. $1,224,820. Tractors. Chicago, Ill. Army Mobility Command, St. Louis, Mo.
—Honeywell, Inc., Hopkins, Minn. $3,552,500. Bomb metal parts assembly. New Brighton, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Martin K Eby Construction Co., Wichita, Kan. $14,712,800. Rehabilitation, conversion and construction of facilities at Kansas Army Ammunition Plant, Parsons, Kan. Engineer Dist., Kansas City, Kan.
3—U.S. Rubber Co., Mishawaka, Ind. $1,402,500. Collapsible nylon fabric water tanks. Mishawaka. Army Mobility Command, St. Louis, Mo.
—Bernard McMenamy Contractor, Inc., St. Louis, Mo. $1,452,800. Channel excavation work at the Kaskaskia River, Ill., Navigation Project. Evansville, Ill. Engineer Dist., St. Louis, Mo.
—Bethlehem Steel Corp., Bethlehem, Pa. $3,058,590. Tube forgings for 175mm guns. Bethlehem. Watervliet Arsenal, Watervliet, N.Y.
6—Firestone Tire & Rubber Co., Akron, Ohio. $1,088,550. Bus and truck tires. Akron. Army Tank Automotive Center, Warren, Mich.
—Ford Motors, Dearborn, Mich. $1,189,245. Advance production engineering for 5-ton trucks. Dearborn. General Purpose Vehicles Project Office, Warren, Mich.
—RCA, Camden, N.J. $2,566,914. Radio sets. Camden. Army Electronics Command, Philadelphia, Pa.
—AVCO Corp., Stratford, Conn. $4,744,809 and $2,760,155. Rotor turbine blades, air inlet vanes, deflector assemblies, and miscellaneous repair parts for T-53 engines

for UH-1 helicopters. Stratford. Army Aviation Materiel Command, St. Louis, Mo.

8—U.S. Rubber Co., Detroit, Mich. $2,632,-900. Tires for trucks and trailers. Detroit and Los Angeles, Calif. Army Tank Automotive Command, Warren, Mich.

9—Bendix Corp., South Bend, Ind. $1,497,-996. Nose and main landing gears for OV-1 aircraft. South Bend. Army Aviation Materiel Command, St. Louis, Mo.

—Dirilyte Co. of America, Kokomo, Ind. $1,927,728. Fin blades for 2.75-inch rockets. Kokomo. Picatinny Arsenal, Dover, N.J.

—Muncie Steelworks, Muncie, Ind. $4,512,-105. Nozzle and fin assemblies for 2.75-inch rockets. Muncie. Picatinny Arsenal, Dover, N.J.

—Coastal Construction Co., Houston, Tex. $8,750,882. Work on the Sabine-Neches Waterway, Texas, Project. Port Arthur, Tex. Engineer Dist., Galveston, Tex.

10—Stanford Research Institute, Menlo Park, Calif. $2,363,355. Establishment of a lead laboratory (research and development). Office of Civil Defense, Washington, D.C.

—Amron Corp., Waukesha, Wis. $6,914,194. 20mm brass cartridge cases. Waukesha. Frankford Arsenal, Philadelphia, Pa.

—Pacific Car & Foundry Co., Renton, Wash. $8,671,249. 1½-ton cargo carriers. Renton. Army Tank Automotive Command, Warren, Mich.

13—Kollsman Instrument Corp., Elmhurst, N.Y. $2,337,400. Metal parts for 4.2-inch cartridges. Melrose Park, Ill. Army Procurement Detachment, New York, N.Y.

—Flinchbaugh Products, Inc., Red Lion, Pa. $2,510,016. Metal parts for 152mm projectiles. Red Lion. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Akwa Downey Construction Co., Milwaukee, Wis. $2,422,410. Alterations to launch complexes 25C and 25D at Cape Kennedy, Fla. Canaveral Engineer Dist., Merritt Island, Fla.

—List & Clark Construction Co., Overland Park, Kan. $6,605,162. Work on the Galisteo Dam, N.M., Project. Engineer Dist., Albuquerque, N.M.

14—Holston Defense Corporation of Eastman Kodak, Kingsport, Tenn. $7,033,451. Miscellaneous explosives and operational and maintenance activities. Kingsport. Ammunition Procurement & Supply Agency, Joliet, Ill.

15—H. J. High Construction Co., Orlando, Fla. $2,399,750. Construction of Phase III addition to the Headquarters Building, Kennedy Space Center, Merritt Island, Fla. Canaveral Engineer Dist., Merritt Island, Fla.

—United Aircraft, East Hartford, Conn. $2,860,000. JFTD Space 12A-4A turbine engine assemblies used on CH-54 Flying Crane helicopters. East Hartford. Army Aviation Materiel Command, St. Louis, Mo.

—Thermo King Corp., Minneapolis, Minn. $1,103,233. Trailer mounted air conditioners. Minneapolis. Army Mobility Equipment Command, St. Louis, Mo.

16—Union Carbide Corp., New York, N.Y. $1,218,804. BA-801/PRC dry batteries for AM-4306/PRC-25 radio frequency amplifiers. $2,818,591. BA-279/U dry batteries for AN/PRC-8,9 and 10 radios. Charlotte, N.C. Army Electronics Command, Philadelphia, Pa.

—Servel, Inc., Freeport, Ill. $1,172,928. BA-279/U dry batteries for AN/PRC-8,9 and 10 radios. Freeport. Army Electronics Command, Philadelphia, Pa.

17—Chamberlain Corp., Scranton, Pa. $3,007,-300. Metal parts for 155mm projectiles. Scranton. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Olin Mathieson Chemical Corp., New York N.Y. $2,150,206. Miscellaneous propellant charges and operations and maintenance activities. Charlestown, Ind. Ammunition Procurement & Supply Agency, Joliet, Ill.

—General Motors, Detroit, Mich. $6,184,163. Pick-up trucks. Baltimore, Md.; Fremont, Calif. and St. Louis, Mo. Army Tank Automotive Command, Warren, Mich.

—General Electric, Burlington, Vt. $1,475,-000. 20mm automatic guns. Burlington. Army Weapons Command, Rock Island, Ill.

—Tobler & Oliver Construction and Paul N. Smitler, Carson City, Nev. $1,245,600. Construction of an ammunition maintenance facility at Sierra Army Depot, Herlong, Calif. Engineer Dist., Sacramento, Calif.

—Bell & Howell Co., Chicago, Ill. $1,280,-276. Metal parts for 81mm illuminating shell time fuzes. Chicago. Procurement Detachment, Chicago, Ill.

20—Collins Radio Co., Cedar Rapids, Iowa. $2,102,752. Radio sets with ancillary items. Cedar Rapids. Army Electronics Command, Fort Monmouth, N.J.

—Mason & Hanger, Silas Mason Co., New York, N.Y. $2,158,370. Loading, assembling and packing of medium caliber ammunition. Burlington, Iowa. Ammunition Procurement & Supply Agency, Joliet, Ill.

—E. I. DuPont de Nemours & Co., Wilmington, Del. $1,919,700. Demolition charges. Martinsburg, W. Va. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Grumman Aircraft Engineering Corp., Bethpage, N.Y. $2,865,000. Modernization of OV-1B aircraft. Bethpage. Army Aviation Materiel Command, St. Louis, Mo.

23—Day & Zimmermann, Inc., Philadelphia, Pa. $2,564,352. Loading, assembling and packing of miscellaneous items of medium caliber ammunition. Texarkana, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Bell Helicopter Co., Fort Worth, Tex. $1,-573,209. Gear box assemblies for UH-1 helicopters. $13,023,709. UH-1 helicopter transmission assemblies. Fort Worth. Army Aviation Materiel Command, St. Louis, Mo.

24—Continental Motors, Muskegon, Mich. $1,-647,750. Engines for five-ton trucks. Muskegon. Army Tank Automotive Center, Warren, Mich.

—TRW, Inc., Redondo Beach, Calif. $6,000,-000. Classified electronic equipment. Redondo Beach. Army Electronics Command, Fort Monmouth, N.J.

—Honeywell, Inc., Hopkins, Minn. $4,312,-000. Grenade fuzes. New Brighton, Minn. and St. Louis Park, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill.

27—AVCO Corp., Stratford, Conn. $6,385,502. Product support and product improvement services for T-53 engines during Calendar Year 1967. Stratford. Army Aviation Materiel Command, St. Louis, Mo.

—Grumman Aircraft Corp., Bethpage, N.Y. $1,000,000. Services and supplies to fabricate avionic retrofit kits for OV-1A helicopters (Mohawk). Bethpage. Army Aviation Materiel Command, St. Louis, Mo.

28—ACF Industries, Carter Carburetor Div., St. Louis, Mo. $1,887,619. Metal parts for BLU-3/B bombs. St. Louis. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Scovill Mfg. Co., Waterbury, Conn. $1,-866,817. Metal parts for BLU-3/B bombs. Waterbury. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Martin-Marietta, Orlando, Fla. $4,160,900. Metal parts for XM2E1 canisters. Orlando. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Honeywell, Inc., Hopkins, Minn. $3,948,-538. Three lines of automated assembly machines for production of M219E1 multi use fuzes. St. Louis Park, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Harvey Aluminum Sales, Inc., Torrance, Calif. $3,502,451. Loading, assembling and packing classified items of ammunition. Milan, Tenn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—U.S. Rubber Co., New York, N.Y. $9,-402,682. Manufacture of explosives and loading, assembling and packing artillery ammunition and related components. Joliet, Ill. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Batesville Mfg. Co., Batesville, Ark. $1,-885,873. Metal parts for BLU-3/B bombs. Batesville. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Raytheon Co., Bristol, Tenn. $1,175,634. M905 fuzes for the 750-lb. bomb. Bristol. Ammunition Procurement & Supply Agency, Joliet, Ill.

—General Motors, Indianapolis, Ind. $1,-507,780. TX-100-1 transmissions for M113 personnel carriers. $1,367,244. Rebuilding and retrofitting CD850 transmission assemblies for tank diesel engines. $1,336,690. Rebuilding and retrofitting CD850 transmission assemblies for tank diesel engines. Indianapolis. Army Tank Automotive Command, Warren, Mich.

—Johnson Corp., Bellevue, Ohio. $1,525,064. M116A1, ¾-ton chassis and M101A1, ¾-ton cargo trailers. Bellevue. Army Tank Automotive Command, Warren, Mich.

—General Motors, Detroit, Mich. $1,496,973. Various trucks. Detroit. Army Tank Automotive Command, Warren, Mich.

—Baifield Industries, Carrollton, Tex. $1,-239,000. ½-ton utility trucks. Carrollton. Army Tank Automotive Command, Warren, Mich.

—Ford Motors, Dearborn, Mich. $2,865,553. Tractor trucks. Louisville, Ky. $2,271,712. Various tank trucks. Birmingham, Ala. Army Tank Automotive Command, Warren, Mich.

—Ford Motors, Dearborn, Mich. $3,248,399. Various trucks. Claycomo, Mo. and Mahwah, N.J. Army Mobility Command, St. Louis, Mo.

—FMC Corp., San Jose, Calif. $3,918,380. M113A1 armored personnel carriers and M548 cargo carriers. South Charleston, W. Va. Army Mobility Command, St. Louis, Mo.

—Philco-Ford, Newport Beach, Calif. $61,-445,723. Classified quantity of Shillelagh missiles and guidance and control components. Lawndale, Calif. Army Missile Command, Huntsville, Ala.

—Raytheon Co., Lexington, Mass. $1,204,150 Maintenance and modification of special tooling and test equipment to support the Hawk missile system. Andover, Mass. Army Missile Command, Huntsville, Ala.

—Electronics Assistance Corp., Red Bank, N.J. $4,482,073. General purpose radio receivers. Red Bank. Army Electronics Command, Philadelphia, Pa.

—Philco Corp., Philadelphia, Pa. $5,000,000. Classified electronic equipment. Philadelphia. Army Electronics Command, Fort Monmouth, N.J.

—University of Illinois, Urbana, Ill. $1,200,-000. Twelve months investigative work to continue a program of experimental and theoretical research in pure and applied science in the broad spectrum of modern electronics sciences. Urbana. Army Electronics Command, Fort Monmouth, N.J.

—AVCO Corp., Stratford, Conn. $1,294,267. T-53 turbine engine housing assemblies for UH-1 helicopters. Stratford. Army Aviation Materiel Command, St. Louis, Mo.

—Grumman Aircraft Engineering Corp., Bethpage, N.Y. $1,800,000. Modernization of OV-1C Mohawk helicopters. Stuart Martin County, Fla. Army Aviation Materiel Command, St. Louis, Mo.

—Martin-Marietta, Orlando, Fla. $2,287,754. Metal parts for XM2 canisters. Orlando. Procurement Detachment, Chicago, Ill.

—Lane Construction Corp., Meriden, Conn. $1,371,750. Work in the Blanchard Dam and Reservoir Project. Blanchard, Pa. Engineer Dist., Baltimore, Md.

—Aeronca, Inc., Torrance, Calif. $1,073,266. Metal parts for XM3 mine dispensers. Torrance, Calif. and Middletown, Ohio. Southwest Procurement Agency, Pasadena, Calif.

—TRW Systems, Redondo Beach, Calif. $1,-156,402. Classified work. Redondo Beach, Calif. and Wichita, Kan. Army Security Agency, Arlington, Va.

NAVY

1—Royal Industries, Alhambra, Calif. $1,160,-350. 600-gallon external fuel tanks. Alhambra. Naval Air Systems Command.

—Johns Hopkins University, Silver Spring, Md. $4,870,369. Continued research & development on guided missiles, satellites and ordnance systems. Seaggsville, Md. Naval Ordnance Systems Command.

2—General Precision, Binghampton, N.Y. $1,-500,000. Design, fabricate and test an F-4D weapons system trainer set. Binghampton. Naval Training Device Center, Orlando, Fla.

—North American Aviation, Columbus, Ohio. $14,816,000. Installment funding for the Condor missile. Columbus. Naval Air Systems Command.

—General Electric, Schenectady, N.Y. $10,-440,000. Design and furnishing of Navy nuclear propulsion components for one nuclear powered frigate (DLGN). Schenectady. Naval Ship Systems Command.

8—Todd Shipyards, Seattle, Wash. $1,557,320. Activation work on the minesweeper USS Vigilance (MSF-324). Seattle. Supervisor of Shipbuilding, 13th Naval Dist., Seattle, Wash.

—General Precision, Inc., Glendale, Calif. $1,012,237. Attack directors MK 75. Glendale. Naval Ordnance Systems Command. lated equipment for the Falcon air-to-air missile. Tucson, Ariz. Aeronautical Sys-

—General Dynamics Corp., San Diego, Calif. $1,914,147. Components for the AN/ASB-12 bomb direction system for RA-5C aircraft. San Diego. Navy Aviation Supply Office, Philadelphia, Pa.

6—Motorola, Inc., Scottsdale, Ariz. $1,565,000. Guidance and control groups for Sidewinder guided missiles. Scottsdale. Naval Air Systems Command.

—General Electric, Schenectady, NY. $3,691,130. Design and furnish nuclear propulsion components. Schenectady. Naval Ship Systems Command.

7—General Motors, Indianapolis, Ind. $2,141,300. Spare parts for T-56A16 engines used in KC-130 aircraft. Indianapolis. Navy Aviation Supply Office, Philadelphia, Pa.

—M. Steinhall Co., New York, N.Y. $1,101,493. Parachute packs and lanyard assemblies used with the MK 56 underwater mine. Roxboro, N.C. Naval Ordnance Station, Louisville, Ky.

—United Boatbuilders, Bellingham, Wash. $12,825,000. Supplies and services for the production of MK 46 torpedoes. North Hopkins. Naval Ordnance Systems Command.

—United Boatbuilders, Bellingham, Wash. $1,297,032. Construction of 51 twenty-six-foot personnel boats. Bellingham. Naval Ship Systems Command.

—Texas Instrument, Inc., Dallas, Tex. $1,211,563. Services and material to accomplish work connected with exploratory effort on the advanced anti-radiation missile guidance system program. Dallas. Navy Purchasing Office, Los Angeles, Calif.

10—Sperry Rand Corp., Syosset, N.Y. $2,087,000. Technical services performed in overhaul of submarines. Syosset Naval Ship Systems Command.

—North American Aviation, McGregor, Tex. $2,520,000. Rocket motors for Sparrow and Shrike missiles. McGregor. Naval Air Systems Command.

—Sanders Associates, Nashua, N.H., $2,185,672. Continued development of a droppable anti-submarine warfare sono-buoy system. Nashua. Naval Air Systems Command.

13—United Aircraft, East Hartford, Conn. $76,201,609. TF-30P-3 and TF-30-P-12 engines. $3,500,000. Phase II development of the TF-30-P-12 engine. East Hartford. Naval Air Systems Command.

15—Raytheon Co., Bedford, Mass. $1,610,000. Installment funding for long lead time effort and material for research and development on AIM-7F Sparrow guided missile rocket motors. Bedford. Naval Air Systems Command.

16—Triumph Industries, Houston, Tex. $1,116,332. Construction of twenty-eight 33-foot personnel boats. Houston. Naval Ship Systems Command.

—Sperry Rand Corp., Bristol, Tenn. $2,508,089. Shrike missiles. Bristol. Naval Air Systems Command.

—Sperry Rand Corp., Great Neck, L.I., N.Y. $1,040,000. Control system modernization of the Terrier MK 76, mods 3 and 5. Great Neck. Naval Ordnance Systems Command.

20—United Aircraft, Stratford, Conn. $2,100,000. HH-3E helicopters for the Air Force. Stratford. Naval Air Systems Command.

—IBM, Washington, D.C. $1,062,987. Single line item requisition forms. Washington, D.C. Navy Purchasing Office, Washington, D.C.

—FMC Corp., San Jose, Calif $1,213,042. Production of model of a cleaning machine for large aircraft. San Jose. Naval Air Systems Command.

—Lockley Machine Co., New Castle, Pa. $2,216,046. Launchers for use with Zuni rockets. New Castle. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—Hughes Aircraft, Culver City, Calif., $3,798,200. Two missile control operator trainers for data and support of F-111B weapon system. Inglewood, Calif. Naval Training Device Center, Orlando, Fla.

21—Lockheed Aircraft, Burbank, Calif. $3,449,500. Modification of SP-2H aircraft. Burbank. Naval Air Systems Command.

—Grumman Aircraft Engineering Corp., Bethpage, N.Y. $1,569,471. Necessary documentation to support a proposal for the E-2B aircraft. Bethpage. Naval Air Systems Command.

—Gould National Batteries, Inc., St. Paul, Minn. $9,899,046. Submarine battery elements and cells. Kankakee, Ill. Naval Ship Systems Command.

23—General Dynamics, Pomona, Calif. $3,000,000. Standard Missile, Type I, guidance control and ordnance sections. Pomona. Naval Ordnance Systems Command.

—FMC Corp., San Jose, Calif. $1,525,000. Engineering services in support of landing vehicle tracked personnel craft. San Jose. Naval Ship Systems Command.

—Avondale Shipyards, Inc., Westwego, La. $3,254,000. Activation and modification of the USS Elk River (LSMR-501). New Orleans, La. Supervisor of Shipbuilding, 8th Naval Dist., New Orleans, La.

—Brewer Drydock, Inc., Staten Island, N.Y. $1,363,000. Regular overhaul of the USS Mazama (AE-9). Staten Island. Supervisor of Shipbuilding, 1st Naval Dist., Boston, Mass.

24—General Dynamics, Pomona, Calif., $15,000,000. Standard Arm missile. Pomona. Naval Air Systems Command.

—Martin-Marietta, Middle River, Md., $1,354,317. Classified equipment. Middle River. Naval Air Systems Command.

27—General Electric, Washington, D.C. $2,230,806. Polaris MK 2 guidance systems. Pittsfield, Mass. Special Projects Office.

—General Electric, Schenectady, N.Y. $5,408,000. Design and furnishing of Navy nuclear propulsion components. Schenectady. Naval Ship Systems Command.

—Sanders Associates, Nashua, N.H. $1,800,000. Continued basic engineering and development of an air droppable ASW sonobuoy system. Nashua. Naval Air Systems Command.

—Bendix Corp., North Hollywood, Calif. $1,940,628. Sonar sets. North Hollywood. Naval Air Systems Command.

28—Hughes Aircraft, Culver City, Calif. $7,000,000. Installment funding for Phoenix missile systems. Culver City. Naval Air Systems Command.

—Horne Bros., Newport News, Va. $1,594,000. Regular overhaul of the auxiliary oiler USS Marias (AO-57). Newport News. Supervisor of Shipbuilding, Fifth Naval Dist., Norfolk, Va.

—Buck Kreihs Co., New Orleans, La. $2,673,000. Activation of the landing craft repair ship USS Satyr (ARL-23). New Orleans. Supervisor of Shipbuilding, Eighth Naval Dist., New Orleans, La.

—Avondale Shipyards, Avondale, La. $3,289,543. Activation of the landing craft repair ship USS Sphinx (ARL-24). Avondale. Supervisor of Shipbuilding, Eighth Naval Dist., New Orleans, La.

MARINE CORPS

6—Raytheon Corp., Andover, Mass. $1,288,999 Updating of the Hawk missile depot repair facilities at Marine Corps Supply Centers at Albany, Ga. and Barstow, Calif. Headquarters, Marine Corps.

AIR FORCE

1—Sperry Rand Corp., Charlottesville, Va. $1,062,922. Production of components for radar equipment on C-130 and C-141 aircraft. Charlottesville. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Burroughs Corp., Paoli, Pa. $5,500,000. Production and installation of an air defense warning and communication system. Paoli and an overseas site. Electronics Systems Div., (AFSC), L. G. Hanscom Field, Mass.

—Goodyear Aerospace Corp., Akron, Ohio. $1,543,260. Production of air cargo handling pallets. Akron. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—Raytheon Co., Waltham, Mass. $3,136,910. Modification of the bomb-navigational system on B-58 aircraft. Waltham. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—Sperry Rand Corp., Great Neck, L.I. NY. $3,461,612. Modification of the bomb-navigational system on B-58 aircraft. Great Neck. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

2—Lockheed Aircraft, Marietta, Ga. $4,000,000. Production of C-130 aircraft. Marietta. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—General Electric, Utica, N.Y. $10,000,000. Production of components for airborne electric systems. Utica. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

3—Hughes Aircraft, Culver City, Calif. $3,225,045. Prduction of spare components and related equipment for Falcon air-to-air missiles. Culver City. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

6—Bendix Corp., Teterboro, N.J. $2,340,630. Production of flight instruments for C-141 aircraft. Teterboro. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Honeywell, Inc., Hopkins, Minn. $1,750,000. Mine fuzes and related equipment. Hopkins. Aeronautical Systems Div., (AFSC) Wright-Patterson AFB, Ohio.

—Westinghouse Electric, Baltimore, Md. $1,090,000. Production of airborne communications equipment. Baltimore. Electronics Systems Div., (AFSC), L. G. Hanscom Field, Mass.

8—United Aircraft, East Hartford, Conn. $2,335,840. Production of spare parts for J-57 aircraft engines. East Hartford. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

—Martin-Marietta, Baltimore, Md. $1,397,500. Engineering of non-integral structures for hypersonic vehicles. Middle River, Md. Systems Engineering Group, Research & Technology Div., (AFSC), Wright-Patterson AFB, Ohio.

9—General Electric, West Lynn, Mass. $2,806,000. T-58 aircraft engines. West Lynn. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

14—General Motors, Milwaukee, Wis. $1,140,000. Production of airborne navigation equipment. Milwaukee. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—General Electric, Cincinnati, Ohio. $2,000,000. J-79 aircraft engine component improvement program. Cincinnati. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

15—General Electric, West Lynn, Mass. $1,937,861. Production of spare components for J-85 aircraft engines. West Lynn. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

—White Motors, Springfield, Ohio. $1,050,000. Production of electrical generators. Springfield. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

16—Eastman Kodak Co., Rochester, N.Y. $1,685,096. Production of photographic processing equipment and spare parts. Rochester. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Lear Siegler, Inc., Grand Rapids, Mich. $1,540,575. Production of flight instruments for fighter aircraft. Grand Rapids. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Schenuit Rubber Co., Baltimore, Md. $1,360,497. Production of tires for KC-135 aircraft. Baltimore. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

17—Honeywell, Inc., Hopkins, Minn. $2,000,000. Production of land mines and associated equipment. Hopkins. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—General American Transportation Corp., Niles, Ill. $4,200,000. Production of bomb components. Niles. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

20—Mitre Corp., Bedford, Mass. $2,150,602. Research and development for systems engineering and technical direction in the field of command and control systems. Bedford. Electronics Systems Div., (AFSC), L. G. Hanscom Field, Mass.

—Honeywell, Inc., Hopkins, Minn. $1,750,000. Production of fuzes for mines and related equipment. Hopkins. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Lear Siegler, Inc., Grand Rapids, Mich. $1,344,051. Production of aircraft bombing computers. Grand Rapids. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

21—Curtiss-Wright Corp., Wood-Ridge, N.J. $3,248,066. Production of spare parts for R-3350 aircraft engines. Wood-Ridge. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

23—Hughes Aircraft, Culver City, Calif. $4,320,000. Production of components and re-

tems Div., (AFSC), Wright-Patterson AFB, Ohio.
Lockheed Aircraft, Burbank, Calif. $1,010,-826. Modification of F-104 aircraft. Burbank. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.
24 North American Aviation, Anaheim, Calif. $3,102,000. Production of depot maintenance equipment to support the Minuteman missile program. Anaheim. Ballistic Systems Div., (AFSC), Norton AFB, Calif.
27 Applied Technology, Inc., Palo Alto, Calif. $1,972,680. Production of airborne radar equipment. Palo Alto. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

Contract Definition Reports Available

Two reports dealing with the contract definition process, of general interest to all persons connected with this phase of development of major DOD systems and of particular interest to those responsible for contract definition of specific development projects, are now available.

"A Report on Contract Definition" was prepared for the Office of the Director of Defense Research and Engineering (ODDR&E) by Peat, Marwick, Livingston and Co.

The second report, "Close Collaboration in Contract Definition," was prepared by the MITRE Corp.

"A Report on Contract Definition" contains discussions and interpretations of pertinent portions of DOD Directive 3200.9, typical activities and timing of Phases A, B, and C of contract definition, and critical areas, such as the prerequisites to engineering development, volume of data and technical transfusion.

"Close Collaboration in Contract Definition," MITRE Technical Paper MTP 48 (ESD TR 67 103), discusses the issues that may arise in the conduct of that part of contract definition during which the Government and its contract definition contractors are intended to closely collaborate with each other. The report deals with questions of what constitutes proper guidance to contractors, what the forms of close collaboration should be, and how sensitive contract definition information is. It also suggests certain administrative and procedural arrangements for helping to assure that contract definition contractors are adequately guided without jeopardizing the maintenance of the fully competitive environment intended during a contract definition effort.

"A Report on Contract Definition" is available to users of the Defense Documentation Center at Cameron Station, Alexandria, Va. 22314, under Order Number AD 816 290. It can be purchased by nonusers through the Department of Commerce Clearinghouse for Federal and Scientific Information, Springfield, Va., 22151, for $3 a copy.

"Close Collaboration in Contract Definition" will also be included in the Defense Documentation Center collection. In the interim, requests for it should be addressed to the MITRE Corp., Attention Dr. N. Waks, P.O. Box 208, Bedford, Mass., 01730.

New Amphibious Vehicle Under Development

The U.S. Army Tank-Automotive Center (ATAC), Warren, Mich., is building seven pilot models of an experimental Marine Corps Marginal Terrain Vehicle (MTV) being developed to operate in the swamps and rice fields of Southeast Asia.

Officially designated the XM759 Cargo Carrier (soft tire tracked), the one-and-one-half-ton vehicle is specifically designed to operate in areas comprised mostly of water and mud.

ATAC was given the job of developing the vehicle through an agreement between the Marine Corps and the Army Materiel Command.

To speed up the program, ATAC took on the job of building the seven pilot models in its shops at the Detroit Arsenal. At the same time requests for quotations were sent out to industry for an advanced production engineering and limited production contract.

The MTV, with a gross weight of 11,500 pounds, will carry 3,000 pounds of cargo or a fully equipped Marine squad of 14, and is operated by a two-man crew.

In appearance it looks like a tracked vehicle except that instead of conventional tracks it has a set of chains on each side resembling giant bicycle chains and 17 wide-track, low pressure terra-tires are strung between the chains. The chains are driven by two large sprockets located on each side at the front. Two similar sprockets at the rear are adjustable to exert tension on the chain.

The vehicle rolls over the wheels in contrast to the normal wheel-axle arrangement where the rolling of wheels moves the vehicle.

The light-weight aluminum construction in combination with the terra-tires will provide the MTV with excellent amphibious capabilities. The air pressure of the tires will be approximately three pounds a square inch. The wheels propel the vehicle at about seven miles an hour over inland waters. Top land speed is about 35 miles an hour.

The vehicle will be controlled the same as any tracked vehicle with turning achieved by the slowdown or stopping of one side while the wheels on the other side are accelerated.

DSA Support To Encompass 19 Weapon Systems

The Defense Supply Agency (DSA) weapon systems support program will provide supply items for the Army's Sheridan tank and the Navy's 3 T's (Terrier, Tartar and Talos) missile ships, beginning in March. This will bring DSA's support of Military Service weapon systems to a total of 19, involving about 157,000 items.

DSA's role in support of Service weapon systems is basically confined to the supplying of maintenance support items which are of the commercial type. They are considered to be the "bits and pieces" of the systems, as opposed to major assemblies, components, end items and major equipment which continue to be supplied directly by the Services.

The scope of this type of support by DSA is reflected in the fact that the agency provides some 70,000 items of the approximately 120,000 items supporting the Polaris system.

For the 17 systems already being supported by DSA, the agency is maintaining a current stock availability of 95 percent of the 140,000 items involved. About half of these items are of the electronic type stocked by the Defense Electronics Supply Center at Dayton, Ohio, a field activity of DSA. The remaining items are scattered between the various other DSA centers throughout the United States.

With the two new additions, DSA will supply about 5,000 items of the Sheridan tank and 12,000 of the Terrier, Tartar and Talos missile ships.

DEFENSE PRIME CONTRACT AWARDS TO SMALL BUSINESS

(Amounts in Thousands)

	July-Dec. 1966	July-Dec. 1965
Procurement from All Firms	$19,387,803	$15,128,683
Procurement from Small Business Firms	3,991,413	3,182,265
Percent Small Business	20.6	21.0

OFFICE OF THE SECRETARY OF DEFENSE
WASHINGTON, D. C. 20301

OFFICIAL BUSINESS

POSTAGE AND FEES PAID

Project Themis

A PROGRAM TO STRENGTHEN THE NATION'S ACADEMIC INSTITUTIONS

Themis, a new university-based research program designed to strengthen the scientific and engineering capabilities of selected academic institutions throughout the United States, and to enable a larger number to carry out high quality research on problems relating to the national security, has been initiated by DOD.

The Secretary of Defense, in announcing the program, stated that the project is being conducted to establish new academic centers of excellence in research areas important to DOD's long range scientific and technological goals.

Brochures have been sent to more than 400 universities describing the aims of the program and requesting the schools to submit proposed programs. Up to 50 new departmental centers will be initiated this year with additional programs to be established in following years.

It is expected that development of additional university graduate research in specific areas relating to defense will contribute to long range U.S. security both by the production of advanced research results and by the research training made possible by a broader base of university centers.

Ninety problems needing research in eight specific areas in science and technology have been identified in which the development of additional university graduate research at the doctoral level could contribute to the national defense. These areas cover the physical, engineering, environmental and medical sciences. Specific areas needing attention are: detection, surveillance, navigation and control; energy and power; information processing systems; technology of military vehicles; materials sciences; environmental sciences, medical sciences, social and behavioral sciences. Submissions covering other prospective research areas of comparable scope and relevance to the defense mission are also invited and will be considered for support under Project Themis.

First consideration will be given in Project Themis to institutions not already heavily engaged in defense research. More than one specific research program can be authorized for a single institution.

Copies of the Project Themis brochure may be obtained by request to the Director of Defense Research and Engineering, The Pentagon, Washington, D.C. 20301.

Space Forecasting Working Group Established

A working group on space forecasting, consisting of scientists working in seven distinct areas of environmental research, has been established at the Air Force Cambridge Research Laboratories (AFCRL), L. G. Hanscom Field, Mass. The group will provide in-depth technical competence in developing and standardizing techniques for forecasting changes in the aerospace environment. It will operate under the chairmanship of Major Ronald A. Bena, Chief of the AFCRL Space Forecasting Branch.

The seven areas of research under the purview of the working group are: high altitude density, ionospheric conditions, energetic particles, geomagnatism, solar radio activity, solar optical activity, and solar x-ray events.

AFCRL's space forecasting program was established in January 1964 to uncover clues that would affect Air Force operations, particularly those changes that might degrade the performance of surveillance and reconnaissance equipments. Space forecasting data are acquired by a host of sensors—ground-based sensors, sensor carrying satellites, instrumented high altitude aircraft, high altitude balloons, and optical and radio telescopes.

EFENSE INDUSTRY BULLETIN

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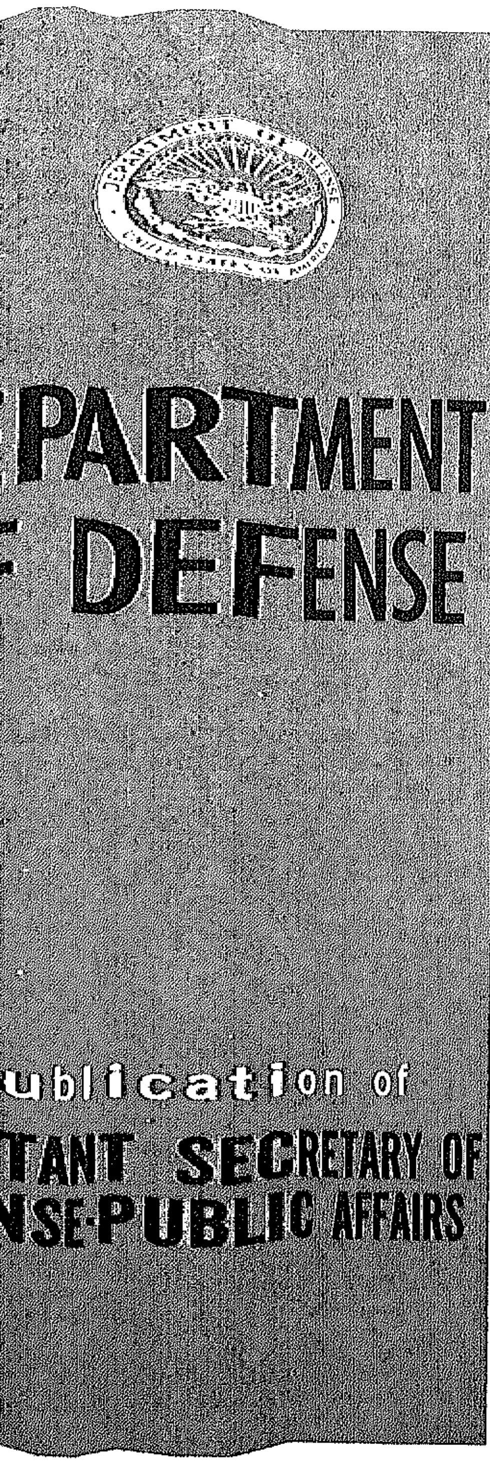

IN THIS ISSUE

DEPARTMENTS

"Share in Freedom" Savings Bond Program

"Freedom must be at all times defended, because it is at all times besieg Not all of us are called to fight on the battlefield. . . . Buying Savings Bon regularly, is as important to this nation in the long reach of history as alm anything we can do.

"We can do no less than those who fight and die for our freedoms. . . ." President Lyndon B. Johnson.

See article, "'Share in Freedom' Bond Program Recommended to Americ Industry," beginning on page 8.

Armed Force Day To Be Observed on May 20, 1967

Secretary of Defense Robert S. McNamara Salutes Members of the Military Services

On this Armed Forces Day, it is fitting that we honor the members of our Military Services whose actions throughout the world are worthy of our nation's noblest traditions.

We recognize that our heritage of freedom, with its accent on the dignity of the individual, is our most valued possession and that it must be constantly defended. Nowhere is this recognized more devotedly than in our Armed Forces.

In Vietnam, and wherever our forces are deployed, more than three million men and women in uniform sustain and defend this legacy against those who would destroy it. They know that freedom cannot be secure in America when it is threatened elsewhere in the world. They realize that our commitments in Vietnam, and to our allies elsewhere, must be upheld.

I urge all citizens to rededicate themselves to the ideals of service to country and devotion to duty exemplified by these courageous men and women and by their families.

American Helicopter Society's Annual Forum To Feature Operations/Management Symposium

The American Helicopter Society will sponsor an Operations/Management Symposium as part of its Annual National Forum to be held at the Sheraton-Park Hotel, Washington, D.C., May 10–12. The symposium will be held in the afternoon on May 11, starting immediately after the membership luncheon.

The purpose of the symposium will be to pinpoint problems and provide open discussion to develop a closer working relationship between industry and DOD personnel concerned with operations/management techniques in the helicopter/VTOL field. Major General Harry W. O. Kinnard, USA, Deputy Assistant Chief of Staff for Force Development, Department of the Army, will be the symposium chairman. Edward W. Goshorn, Boeing Vertol Division, will be assistant chairman.

The symposium is open to all who have an interest in the subject area. Attendees will also be welcome at a variety of other events of the forum including the Technical Trade Exhibit where several helicopters and many other products will be displayed.

An addition to this year's forum proceedings will be the premiere showing of the society's first motion picture, "Vertability," whose title corresponds to the theme of the forum. Preparation of this film was begun in December, when industry was asked to contribute its 16mm footage for selection of appropriate scenes illustrating the growth of vertical flight. After the premiere, the film will be made available first to the ... ons, and

DEFENSE INDUSTRY BULLETIN

Published by the Department of Defense

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Secretary of Defense

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The *Defense Industry Bulletin* is published monthly by the Business & Labor Division, Directorate for Community Relations, Office of the Assistant Secretary of Defense (Public Affairs). Use of funds for printing this publication was approved by the Director of the Bureau of the Budget.

The purpose of the *Bulletin* is to serve as a means of communication between the Department of Defense (DOD) and its authorized agencies and defense contractors and other business interests. It will serve as a guide to industry concerning official policies, programs and projects, and will seek to stimulate thought by members of the defense-industry team in solving the problems that may arise in fulfilling the requirements of the DOD.

Material in the *Bulletin* is selected to supply pertinent unclassified data of interest to the business community. Suggestions from industry representatives for topics to be covered in future issues should be forwarded to the Business & Labor Division.

The *Bulletin* is distributed without charge each month to representatives of industry and to agencies of the Department of Defense, Army, Navy and Air Force. Requests for copies should be addressed to the Business & Labor Division, OASD(PA), Room 2E813, The Pentagon, Washington, D.C. 20301, telephone, (202) OXford 5-2700.

Development of Procurement Policy

by

Lt. Col. Jacob B. Pompan, USAF

In the past few years the Armed Services Procurement Regulation (ASPR) has become an impressive document both in size and structure. As a direct result of Secretary of Defense McNamara's directive to eliminate the publication of implementing procurement regulations by each of the separate Services, the ASPR has become the sole source of major policy guidance for procurement within the entire Defense Department. Absorbing and standardizing much of what had previously been in the departmental regulations of the Military Services caused a natural expansion in the size of the ASPR, and has resulted in a much broader application of that regulation throughout industry as well as within the Services.

In addition to this expansion of the ASPR, the very character of the ASPR has been altered. Prior to this intensive effort to standardize procurement regulations, the ASPR had been primarily a document of major policy, as distinguished from one of procedures. Detailed procurement procedures were covered in the various procurement regulations of the Army, Navy and the Air Force. However, in the process of eliminating policy implementation from these Service regulations, it became apparent that policy and procedure were so closely intertwined that to standardize one while neglecting the other would, in many cases, result in no improvement, and could easily increase the danger of confusion. Today, therefore, the ASPR covers not only the policies but also many of the procedures to which all of the Services must adhere.

While this drastic change in size and character of the ASPR has its roots in sound procurement management, it has not been accomplished without difficulties. For instance, the size of the regulation alone makes its mastery as an operational tool an awesome task. In addition, the fine balance which is required between precise wording and an easy workability of the regulation is extremely difficult to achieve. But perhaps the single, most critical problem lies in the area of communication. While DOD undertook the development of a single procurement regulation in order to establish a standard throughout DOD in the policy area, and the largest part of that task has been accomplished, what remains is the not insignificant task of communicating to the operating level of both industry and Government the substance of the regulation in a totally understandable and usable form.

Although this communication problem is common to all large organizations, it could be particularly serious in DOD. The vast scope of defense contracting activities and the number of contract actions, as well as the broad jurisdictional coverage of the ASPR, all combine to create a potentially serious problem. However, this is an area that has not been neglected by DOD. A primary goal of the procurement policy organizations within DOD is to insure that the operating level within each of the separate Services and the Defense Supply Agency has a common understanding of the policies approved by the Office of the Secretary of Defense (OSD) and that they implement them in a manner consistent with approved DOD-wide standards.

Lt. Col. Jacob B. Pompan, USAF, is a student at the Air War College, Maxwell AFB, Ala. Before entering AWC he was assigned in the Directorate of Procurement Policy in Headquarters, USAF, and was the Air Force policy member of the Armed Services Procurement Regulation Committee. Upon completion of the course at AWC in June, Col. Pompan is scheduled to be assigned to the Defense Contract Administration Services, Defense Supply Agency.

The purpose of this article is to shed some light on how these procurement policies are developed and how the task of communication is being approached.

The Armed Services Procurement Regulation Committee.

The major portion of the ASPR is initially developed in depth and finally approved for publication by the ASPR Committee. This OSD committee is under the supervision of the Deputy Assistant Secretary of Defense for Procurement, in the Office of the Assistant Secretary of Defense (Installations and Logistics). It is made up of two representatives from each of the three Military Departments, two from the Defense Supply Agency (DSA), and a chairman and executive secretary from OSD. One member from each of the departments acts as a policy member, while the other participates as a legal member.

The committee meets at least two full days each week throughout the year. Proposed changes or additions to the ASPR are listed as cases on a formal agenda. Cases are generally initiated and forwarded to the committee for consideration by any of the members. However, other Government activities or, as a matter of fact, any source that has an interest in the material covered by the ASPR can forward proposals to the committee. The agenda items are reviewed in committee to insure that the purpose of each proposal is clearly understood and that the proposal has sufficient merit to warrant further study.

The ASPR Committee operates through a subcommittee system. When a proposal initially appears too complex for an immediate decision but seems worthy of additional study, it is sent to an ASPR subcommittee. This subcommittee is composed of representatives from each department and is generally chaired by the Service with the predominant interest in the particular issue. The subcommittee reviews all facets of the proposal and either recommends rejection or submits detailed coverage to the committee. Upon return of the subcommittee report to the ASPR Committee, each member is given the opportunity to review the proposal

viations from ASPR, and it is the responsibility of contracting officers to request such deviations whenever they are required in the best interest of the Government. For the purpose of this paragraph, a deviation shall be considered to be any of the following:

"(i) when a contract clause is set forth in ASPR for use verbatim, use of a contract clause covering the same subject matter which varies from the ASPR coverage, or use of a collateral provision which modifies either the clause or its prescribed application constitutes a deviation; however, in the case of a purchase or contract of an offshore contracting activity with a foreign contractor made outside the United States, its possessions, or Puerto Rico, such contract clauses may (subject to the direction of authority above the level of the contracting officer) be modified if no change in intent, principle, or substance is made (offshore contracting activities shall keep the cognizant unified Commander advised of significant deviations effected under this subparagraph (i));

"(ii) when a contract clause is set forth in ASPR but not for use verbatim, use of a contract clause covering the same subject matter which is inconsistent with the intent, principle and substance of the ASPR clause or related coverage of the subject matter;

"(iii) omission of any mandatory contract clause constitutes a deviation;

"(iv) when a Standard, DD, or other form is prescribed by ASPR or a Department of Defense Directive, use of any other form for the same purpose constitutes a deviation;

"(v) alteration of a Standard, DD, or other form (other than Departmental forms), except as authorized by ASPR or a Department of Defense Directive constitutes a deviation;

"(vi) when limitations are imposed in ASPR or a Department of Defense Directive upon the use of a contract clause, form, procedure, type of contract, or any other procurement action, including but not limited to the making or amendment of a contract, or actions taken in connection with the solicitation of bids or proposals, award, administration or settlement of contracts, the imposition of lesser or greater limitation constitutes a deviation; or

"(vii) when a policy, procedure, method, or practice of conducting procurement actions of any kind at any stage of the procurement process is covered by ASPR, any policy, procedure, method, or practice which is inconsistent with that set forth constitutes a deviation.

"1-109.2 *Deviations Affecting One Contract or Transaction.* Deviations from this regulation or a Department of Defense Directive which affect only one contract or procurement may be made or authorized in accordance with Departmental procedures *provided* (i) special circumstances justify a deviaton and (ii) written notice of such deviation is furnished to the Assistant Secretary of Defense (Installations and Logistics); and in the case of the Department of the Army, to the Assistant Secretary of the Army (Installations and Logistics), Attention: ASPR Policy Members; the Department of the Navy, the Chief of Naval Material, Attention: Code MAT 21C; Department of the Air Force, Director of Procurement Management, DCS/S&L, Attention AFSPM-AS; and the Defense Supply Agency, Executive Director, Procurement and Production, Attention: DSAH-PM. Such written notices shall be given in advance of the effective date of such deviations unless exigency of the situation requires immediate action.

"1-109.3 *Deviations Affecting More Than One Contract or Contractor.* Except as authorized in 1-109.2, deviations from this Regulation or a Department of Defense Directive will not be effected unless approved in advance by the Assistant Secretary of Defense (Installations and Logistics); *provided*, however, that unanimous approval by the members of the ASPR Committee will constitute approval of the Assistant Secretary of Defense (Installations and Logistics) of all matters except those involving major policy. Written requests for such approval will be submitted to the Assistant Secretary of Defense (Installations and Logistics) through the ASPR Committee as far in advance as exigencies of the situation will permit, or alternatively, at the option of the Materiel Secretary concerned, through use of the Materiel Secretaries' Weekly Conference."

OSD and the Communications Loop.

The ASPR Committee is now processing over 300 cases a year. Recently it underwent a soul searching exercise initiated by the Deputy Assistant Secretary of Defense for Procurement to analyze the operation and search for changes which might improve this workload of complex cases. Some changes were made, but they were more form than substance—and I think properly so. The subjects covered by the ASPR Committee are becoming more and more complicated by the very nature of the state of the art in procurement concepts. If the ASPR is to reflect accurately these changing concepts, it seems only reasonable that it will become a more complex document. In recognition of this, the departmental representatives attempt to establish the foundation for effective communication through the early coordination of the proposed changes with their field organizations.

Building on that foundation requires a knowledge not only of the regulations, but the concepts behind them. This article will mention two activities within DOD where resources are being applied to establish a complete understanding of the procurement regulations and so build on that foundation.

• Training. The management of procurement training by the Services is now centralized within the OSD under the Deputy Assistant Secretary of Defense for Procurement. One of the functions of that office is to establish the curriculum and the standards for procurement training throughout DOD. In addition, that office monitors the courses to insure that the precise policies being taught reflect the spirit and intent of DOD. It is interesting to note that industry representatives participate with DOD in determining the procurement training curriculum.

(*Continued on Page 10*)

Configuration Management in the Navy

by

Capt. William Seith, USN

The Navy has traditionally supported the concept in material acquisition that both the Naval user and the prime contractor are product co-managers. Configuration management, in the product management sense, has always been employed in the design-engineering-production activities of the engineer and the production manager. Interactions are coordinated with fleet and shore readiness requirements for material maintenance management, and program and inventory control support for supply management.

Although configuration management has been practiced in varying degrees within the Navy, the need for configuration management as a total discipline in the Navy is recognized and has been emphasized in the findings and recommendations of the Navy Logistic Support Task Force. The "Plan for Configuration Control" outlined specific program requirements for configuration management.

From this objective, there evolved a basic plan for the Navy's Configuration Management Program as promulgated in Naval Material Command Instruction 5000.6. This plan is to:

- Implement DOD policies and principles for configuration management within the Department of the Navy.
- Improve configuration management throughout the concept formulation, contract definition and acquisition phases of new Naval warfare systems.
- Establish controls of alterations and changes at all echelons and all phases of applicable functions.
- Develop and implement a system for effective total configuration management to provide complete, accurate and up-to-date configuration status accounting data files.
- Determine and maintain current configuration for new construction and inservice Naval warfare systems.
- Improve the coordination and processing of configuration changes, including waivers, deviations and design changes, between the Naval Systems Commands/Project Managers and the Navy Inventory Control Points (ICP's) in updating spare and repair parts toward achieving effective program and inventory control support.

It is anticipated that, in carrying out this plan, the Navy will be able to achieve the objectives of configuration management. These objectives have been variously stated by others but, for a fuller understanding of the Navy's plan, it is well to present them here. The objectives of configuration management in the Department of the Navy are to:

- Assist management in achieving required item performance, operational efficiency, logistics support and readiness by providing the necessary level of configuration identification, control and status accounting.
- Allow the maximum degree of design and development latitude, yet introduce at the appropriate time the degree and depth of control necessary for production and logistics support.
- Attain maximum efficiency in the management of changes with respect to the cost and timing of processing, content, evaluation, implementation and recording.
- Attain the optimum degree of uniformity in configuration management policy, procedures, data, forms and reports at all interfaces.
- Accomplish configuration identification, control and status accounting through maximum utilization of tec nical data and information acquir in other management areas and provide a sound technical base f management decisions.

Capt. William Seith, USN, is Dir. of Configuration Management and Standardization on the staff of the Chief of Naval Material. Previous tours as an Engineering Duty Officer have included assignments on the Inspection and Survey Board; as Industrial Manager, 15th Naval District; and Supervisor of Shipbuilding, Conversion and Repair.

There is also a need for the positioning of configuration management in the Navy with other management improvement advances both in the Navy and DOD. A presentation of this positioning was made at the Los Angeles meeting of the American Society for Quality Control, Nov. 29 1966. It was announced then that the Navy was preparing a manual for configuration management to provide visibility for this positioning and to describe the interrelationships.

The Navy's Configuration Management Manual will prescribe management procedures and implementing principles to be followed in effecting within the Department of the Navy established policies for configuration management of Navy material items. It will reflect all current policy issuances from higher authority affecting this area of operation throughout DOD. Further it will reflect Navy policy issuances still in effect and support those on-going Navy programs which are to be continued and intensified.

A draft manual is essentially completed for coordination purposes within the Navy and recommendations leading toward a final document. It is anticipated that the final review will be accomplished in early 1967.

The format of the Navy's configuration management manual is as follows:

Glossary of terms.
Table of Contents.
I. Introduction.
II. Policy, Relationships and Responsibilities.
III. General Information and Life Cycle Coverage.
IV. Configuration Identification.
V. Configuration Control.
VI. Configuration Status Accounting.
VII. Audits.
VIII. Contract Provisions.

The first three sections provide an introduction to and background for

NAVY CONFIGURATION MANAGEMENT LIFE CYCLE INTERFACE NETWORK

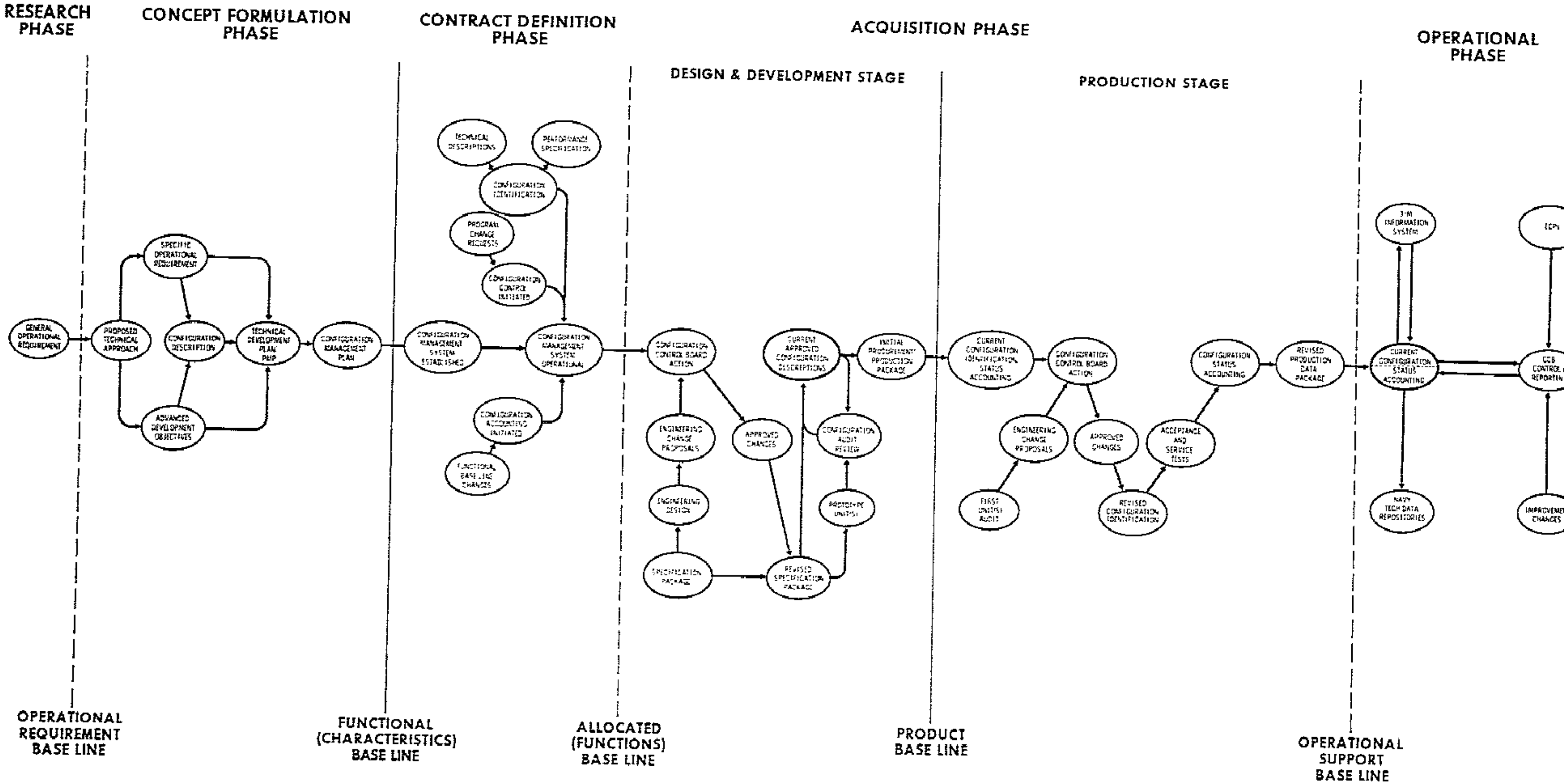


Figure 1.

configuration management in the Navy; policy, relationships with other programs, and the designation of management responsibilities to the Headquarters, Naval Material Command, the Designated Project Managers, the Systems Commands (Air, Electronics, Ordnance, Ships, Facilities, and Supply), and the Navy operating forces.

Information on the basic plan for Navy configuration management is presented as dependent upon other functional management areas. The concept of base line management is reinforced in the manual through life cycle interface networks. The need for flexibility in base line management is recognized for adaptation to a particular project, to product management, and to the method of acquisition of Naval material items and their stage of life.

An abbreviated presentation of the activity of configuration management and its influence on other functional areas is made in the Navy Configuration Management Life Cycle Interface Network, Figure 1. The network also traces the various base lines as arranged in an orderly pattern in accordance with their phase relationship. Base line management is achieved by developing the functional characteristics and technical descriptions of a Navy material item at designated points in its life cycle through the use of uniform documentation engineering control. The employment of the base line technique ensures an orderly transition from one major commitment point to the next in the system engineering process. The base lines serve as engineering reference points and represent the progressive and evolutionary development of specifications, engineering drawings, associated lists, and related technical and management data. The documentation forms a base line technical description that, when joined with documentation of all approved changes subsequent to the base line, provides the approved current configuration identification of the item. A base line technical description includes only a selective position of the total data that has been determined necessary for configuration identification, control and status accounting. Necessary configuration changes, together with additional selections or deletions of data, make up the current configuration identification. The network traces configuration management and the more significant interfaces from inception in the research phase to continuation in the operational (use) phase. The network also introduces the following base lines and their phase relationships:

- Operational requirement base line.
- Functional (characteristics) base line.
- Allocated (functions) base line.
- Product base line.
- Operational support base line.

Throughout the manual considerable emphasis is placed on the dependence of configuration management upon other functional management areas. The technical data and information required for configuration management must constitute, to the maximum possible extent, an integrated, non-redundant portion of the total technical data requirement. (Refer to the *Defense Industry Bulletin*, June 1966, "Navy Authorized Data List—A Management Technique".) The objective of DOD to acquire most economically the minimum amount of data needed to procure and support military systems, materials and services will be supported by this integration.

Relationships to Other Navy Programs.

The operating relationships between configuration management and several other programs are recognized and the configuration management procedures set forth in the Navy's manual are to be compatible with them. Some of the more prominent programs in the Navy having management interface with configuration management are:

The Total Development Plan Concept—An anticipated consolidation of the requirements of the Technical Development Plan and the Project Master Plan. This concept emphasizes the delegation of management authority rather than top level detailed control. A tight discipline of configuration management, first of performance and then of physical characteristics, is required to support such a concept.

The Standard Navy Maintenance and Material Management (3-M) Program—A program to improve the material readiness of the fleet through improved management of maintenance and material functions. A necessary inclusion in the manual is the development of requirements and procedures for reporting fleet and field configuration change reporting via the 3-M Maintenance Data Collection System (MDCS) for ultimate integration into designated master configuration files of the Naval Systems Commands or Designated Project Managers.

The Navy Logistic Support Improvement Plan Contains objectives having significant relation to standardization configuration management. These include the development of means to increase standardization of ship types and equipments in the shipbuilding program. Standardization planning will provide for the:

- Use of a minimum of sizes, types, varieties and kinds of components, equipments and parts.
- Use of identical components and equipments wherever complete functional interchangeability exists.
- Re-use of reliable, in-use components equipments supported by repair parts currently in the supply system.

Configuration elements will be included and rigidly controlled in Master Configuration Listings. The configuration management plan is to include procedures and criteria for thorough evaluation and demonstration of the cost effectiveness of proposed alterations, improvements, or other engineering changes. The Navy Configuration Management Program provides for the development and maintenance of uniform policies, procedures, and implementing principles for the attainment of these objectives.

Integrated Logistic Support—Established by DOD Directive 4100.35, it is defined as a composite of the elements necessary to assure the effective and economical support of a system or equipment at all levels of maintenance for its programmed life cycle. Logistic elements include all resources necessary to maintain and operate an equipment or weapon system, and are categorized as follows: planned maintenance, personnel, technical logistic data and information, spares and repair parts, support and test equipment, facilities, and contract maintenance. A major benefit will be achieved in the integrated logistic support area by procedures for concurrent consideration of configuration changes to material items and to the related technical data, operating computer programs, spares/repair parts, training devices/equipment, support/test equipment, maintenance/repair procedures and tooling.

val Warfare System Engineering ration—A process of forming one complete functional system or more functionally related on system segments that have ronics, electrical, mechanical, tural, facility, or other engineer- nterfaces between them for the lete warfare system. The man- rovides for the initial prepara- and continued maintenance of guration identification: for exam- nterface control drawings, coor- ion drawings, and master config- on lists; the control of engineer- design) changes affecting system rmance of inter-system inter- ; and the establishment of cor- data elements for configura- status accounting records.

w to Configuration gement Manual

preview of the procedural sec- of the manual follows:

tion IV, Configuration Identifica- of the manual presents con- tion management exercised gh the utilization of progres- more detailed identification in orm of base line technical de- ions. For every item, there shall configuration identification that, e start of development, will y the required functional and al chearacteristics and, after y, describe those characteris- s achieved. The initial techni- scriptions are the base lines of ration management. The base nd all approved changes there- an item's current configuration ication.

identification base lines are tory, the functional base line he product base line. Other nal base lines are termed onal requirements, allocated ons), and operational support, h the latter may include prod- rovement.

a continuing basis, the com- physical and functional char- ics, as amended to reflect in- changes/alterations/improve- (the operational support base will be established through the ng (use) phase of the item.

preparation of configuration cation, i.e., the technical de- ns, will be consistent with the ment / production / operational tern of the involved Navy ma- tem, and the descriptions will e following criteria:

new Naval warfare systems and major projects, complete technical descriptions will be prepared for each of the appropriate base lines outlined in Figure 1 and to the base line technical description requirements.

• For Naval warfare systems and major projects now in engineering and operational systems development, the technical descriptions will be prepared to the functional base line. The functional (characteristics) base line normally results from the concept formulation phase and generally will require complete follow-on technical descriptions similar to those for a new system/project.

• For Naval warfare systems and major projects now in production, the product base line will be the first base line to be established. The technical descriptions for the product base line will include those appropriate general, detail, performance, or design specifications, engineering drawings, data lists, test procedures and other data that define the physical and functional characteristics of the item at the beginning of production, together with all approved changes since production initiation. Such technical descriptions may not be the complete descriptions as called for under new or partial development, but must be adequate to provide a basis for configuration audit and configuration status accounting.

• For Naval warfare systems and major projects in operational use and out of production, only the operational support base line will be established at this point of the life cycle. The technical descriptions for the operational support base line will depend on the existence or necessary reconstruction of technical data to provide the identification

Section V, Configuration Control, requires that configuration control shall be exercised at all echelons of command in the Navy. The configuration of items will be managed by controlling changes to the current configuration identification that describes the functional and physical characteristics of the items. All affected activities will participate in consideration of both proposed base lines and of all proposed changes from those base lines throughout the life cycle of the item.

All new Navy change control programs will be implemented to ensure control over configuration identification and to maintain configuration status accounting in accordance with the policies, procedures and implementing principles of the manual. Existing change control procedures will be reviewed and revised as necessary to ensure compliance with the manual.

Section VI, Configuration Status Accounting, requires that reporting and recording for configuration management include delineation of the mandatory base line, status of proposed changes to the base line, effectivity and status of implementation of approved changes, and delineation of the item's current configuration identification. Data records will be maintained in a manner ensuring the continued visibility needed to manage the configuration effectively. Records shall be automated only when the volume of data recorded or the information retrieval response time required for configuration accounting makes automation economically feasible and desirable. Data record complexity will be consistent with configuration identification and may be established to varying formats as required by the functional or project manager, provided that the following objectives are fulfilled:

• Standard data elements are used for attainment of an optimum degree of uniformity in status accounting procedures, data, forms and reports at all interfaces with industry, and between internal organizational segments of the Naval systems commands, Chief of Naval Material designated project managers, and Navy offices.

• The configuration status accounting program, as established, is consistent with the intended needs, cost and complexity of the applicable hardware.

• The configuration status accounting records will provide the necessary information within an allotted time frame to the appropriate manager or engineer to permit effective engineering, logistic support and management decisions.

Section VII, Configuration Audits, requires that appropriate levels of command shall ensure by audit that the functional and physical characteristics achieved in an item match those specified in the item's configuration identification. First Unit Audits, Technical and Operation Evaluations, Board of Inspection and Survey Trails, and Production Demonstration and Acceptance are typical audits. Due to the wide variety

(Continued on Page 12)

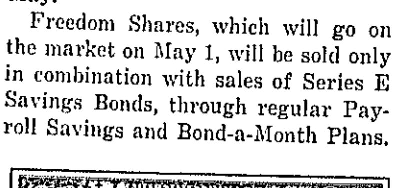
"Share in Freedom" Bond Program Recommended to American Industry

Have you taken a long, hard look at Payroll Savings in your organization lately?

There is no better time than now, for the Treasury's Savings Bonds Program has a new look.

President Lyndon B. Johnson launched the 1967 "Share in Freedom" Bond Campaign with the announcement of a companion Savings Note, popularly called a "Freedom Share." The President's announcement was made on a nationwide, closed-circuit telecast from Washington to meetings of some 10,000 Savings Bonds volunteers in 32 cities. The meetings were held to announce plans for this year's intensive sales campaign in April and May.

Freedom Shares, which will go on the market on May 1, will be sold only in combination with sales of Series E Savings Bonds, through regular Payroll Savings and Bond-a-Month Plans.



The new security earns 4.74 percent interest when held to maturity—four and one-half years. It must be held for one year before it can be cashed.

Series E Bonds continue to earn 4.15 percent interest when held to maturity—seven years.

Freedom Shares will be sold in four denominations—$25, $50, $75 and $100—with purchase prices of $20.25, $40.50, $60.75 and $81, respectively. There will be an annual limitation on holdings of $1,350 face value, and Payroll Savings deductions are limited to $20.25 per weekly pay period, $40.50 per biweekly pay period, or $81 per monthly pay period.

With an investment of $39 for the smallest Bond/Share combination, a purchaser can get back $50—half in four and one-half years, the other half in seven years. The combined yield of the two securities, if each is held to full maturity, is 4.39 percent.

In introducing the Freedom Share—a temporary addition to the Savings Bonds "line"—President Johnson said:

"Freedom must be at all times defended, because it is at all times besieged. Not all of us are called to fight on the battlefield. Many of us must quietly and firmly do what we can and all that we must here at home. Buying Savings Bonds, regularly, is as important to this nation in the long reach of history as almost anything we can do.

"We can do no less than those who fight and die for our freedoms. Last year, American servicemen bought almost $350 million worth of Savings Bonds—close to $90 million in the last quarter alone. Battle honors come hard in Vietnam, because the price of honor is often the price of life. Yet in jungle and hamlet—on shipboard and airfield—there is one trophy that every American unit prizes. It is not the enemy's flag. It is the Minute Man Flag that symbolizes 90 percent or better participation in the Payroll Savings Plan.

"Throughout Vietnam, there are scores of units who fly those flags for all our countrymen to see. I have seen them in Vietnam. They are declarations of our faith, and they declare that we are still the people that the poet saw—with 'The flash of freedom in their souls and the light of knowledge of their eyes.'"

The President's personal interest in the Bond Program is well evidenced by the payroll savings participation rate of White House employees—100 percent.

The Savings Bonds Program enjoys top-level support in both Government and industry. Postmaster General Lawrence F. O'Brien is chairman of the Interdepartmental Savings Bonds Committee. Daniel J. Haughton, President of Lockheed Aircraft Corp., is chairman of the 1967 Industrial Payroll Savings Committee. Labor, too, gives the program strong backing. George Meany, President of the AFL/CIO, is spearheading labor's participation.

Industry's goal in this year's campaign is 2,500,000 "Payroll Patriots" who will join the Payroll Savings Plan or increase their current allotment for Savings Bonds.

Lyndon B. Johnson announces Freedom Shares.

The campaign brochure of the U.S. Industrial Payroll Savings Committee stresses "opportunity," pointing out that:

"The Payroll Savings Plan for U.S. Savings Bonds offers your employees a way to build personal security in one of the world's safest investments. But more than that, it offers you and your employees a way

—to help MAINTAIN the strength of the dollar

—to EXPRESS patriotism in an effective way

—to BACK our free enterprise system."

Heads of companies, both large and small, which have successful Payroll Savings Plans, find these to be the chief advantages:

• **Systematic Savings.** The Payroll Savings Plan is an effective way for employees to save for the future—easy, systematic thrift through which savings build automatically into substantial reserves. These reserves will guarantee families more security and can be a foundation for personal financial planning.

• **Patriotism.** Employees reaffirm their faith in our country when they buy bonds. They become shareholders in America's future.

• **Tax Advantages.** Interest earned on Savings Bonds and Freedom Shares is exempt from state and local income taxes. Payment of Federal income tax on E Bond and Freedom Share interest may be deferred until redemption. The result is increased effective return on the investment.

• **Economy and Safety.** There is no charge for buying or redeeming U. S. Savings Bonds and Freedom Shares. They are registered in the owner's name and are replaceable at no charge if they are lost, stolen, or destroyed. They may be issued in the owner's name, or with a co-owner, or with the name of a beneficiary.

• **Ready Cash.** Employees can meet short-term financial needs without withdrawing at a disadvantageous time from long-range commitments. Although the new Freedom Shares must be held a full year, E Bonds may be redeemed at any time after two months from the date of issue. Savings Bonds are not affected by fluctuations of the market.

Business leaders find company benefits too:

• **Team Spirit.** A company-wide Savings Bonds campaign builds team spirit—a valuable asset to any company. There is no better way to make an employee genuinely feel a part of the team than working directly with him toward a better, more stable future for him, his company and his country.

• **Employee Morale.** Employees with financial stability tend to be better workers. More free of financial problems than those who don't save, payroll savers can concentrate on their jobs.

• **Debt Management.** Savings Bonds are a key element in sound management of a public debt. Over $50 billion—23 percent of the publicly held portion of the debt—are in Series E and H Savings Bonds.

• **A Bulwark for Free Enterprise.** The Savings Bonds Program, built around industry support of the Payroll Savings Plan, works for a strong, stable dollar—the foundation of the American free enterprsie system and of the strength of our nation.

Campaign Chairman Haughton believes that success in Payroll Savings starts with top management support. In his words, "There are several steps to running a successful campaign, but there is one overriding thing it must have all the way to be a success, and that is the personal, enthusiastic support of the top management in the company. If it does, it will filter down through the entire organization, and can't miss."

Secretary of the Treasury Henry H. Fowler congratulates Daniel J. Haughton (left), President, Lockheed Aircraft Corp., on appointment as Chairman, 1967 Industrial Payroll Savings Committee. Looking on is the outgoing chairman, Lynn Townsend (center), Chairman of the Board, Chrysler Corp.

1966 Honor Roll Defense Contractors U.S. Savings Bonds Program

(Percentage of Employee Participation)

Lockheed Aircraft Corp.	99%
Radio Corp. of America	95
Kennecott Copper Corp.	94
Ling-Temco-Vought, Inc.	90
Republic Steel Corp.	88
United Aircraft Corp.	88
ARO, Inc.	83
Marquardt Corp.	82.5
Gulf Oil Corp.	82
American Machine & Foundry Co.	82
Martin-Marietta Corp.	82
Aerojet-General Corp.	80
Northrop Corp.	79
Chrysler Corp.	78
Boeing Co.	78
McDonnell Aircraft Corp.	78
International Telephone & Telegraph Corp.	78
North American Aviation, Inc.	77
Texas Instruments, Inc.	75
Aerospace Corp.	75
Ryan Aeronautical Co.	72

Republic Aviation Corp.	70	E I. DuPont DeNemours & Co.	62.9
Blaw-Knox Co.	69	Thiokol Chemical Corp.	62
General Motors Corp.	69	Remington Arms Co., Inc.	62
General Electric Co.	68.9	Whirlpool Corp.	62
Raytheon Corp.	68	Aluminum Co. of America	62
Kelsey-Hayes Co.	67	Goodyear Tire & Rubber Co.	61
Firestone Tire & Rubber Co.	65	United States Steel Corp.	59
Western Electric Co., Inc.	65	Beech Aircraft Corp.	58
General Dynamics Corp.	63	Bendix Corp.	58
Douglas Aircraft Co., Inc.	63	TRW, Inc.	55

THE SECRETARY OF DEFENSE
WASHINGTON

April 3, 1967

Dear Defense Contractor:

The Treasury Department will, within a few weeks, launch the most vigorous Savings Bonds Campaign since the end of World War II.

The importance of the Savings Bonds Program has been underscored many times in the past by President Johnson. Just recently he announced a new Treasury Security, popularly known as the Freedom Share, which will earn 4.74 percent interest when held to maturity of four and one-half years. This new Freedom Share will be available only in combination with the Series E Bond.

I am aware of the outstanding efforts on the part of defense contractors in promoting employee participation in the Payroll Savings Plan. Many contractors have achieved 50 to 75 percent or more employee participation in this most successful thrift plan.

Increased Savings Bonds sales at this time will help greatly to strengthen our national economy and to support our fighting men in Vietnam. I am proud that many of our military units in Vietnam are flying the Minute Man Flag denoting 90 percent participation.

Your cooperation is needed to make the Freedom Share Campaign a success. Please give serious consideration to conducting a personal canvas of all your employees.

The Savings Bonds Division of the Treasury Department has available free promotional materials and will assist you in planning and conducting a campaign among your employees.

Thank you.

Sincerely,
Robert S. McNamara

Development of Procurement Policy

(Continued from Page 3)

• **Procurement Management Survey.** Along with the training function, OSD has developed a DOD procurement management survey system. While these procurement surveys are managed and conducted by the separate Services, the overall policy control for the system rests in OSD. In this manner the standards of review are established for all the Services at a single point. The survey teams include skilled technicians who know the DOD policies in each area and can recognize when they are being misinterpreted. Among other things, these teams evaluate how effectively the procurement organizations are implementing the regulations and policies which were established for compliance throughout DOD. They look for the causes and the cures if there are deviations from the standards. Further, once their findings have been furnished to the procurement staffs in Washington, the "policy loop" has been closed.

Procurement policy making at its best is a difficult task. It is beset by problems of vast distances, a wide range of participants, and a generous share of dissenters. There is clear recognition today that the ASPR is only the first part of the policy-making loop. If it is to continue to be a meaningful and successful document, there must be a continuous and intelligent application of resources to insure that the words and spirit are understood by industry as well as Government, and that deviations from the standards are isolated and analyzed.

Today, with increasing emphasis on closing every part of this loop, I think that there is ample reason for optimism.

Naval Terms Dictionary Available

The second edition of "Naval Terms Dictionary" has been published by the U.S. Naval Institute, Annapolis, Md.

The new revised edition has been greatly expanded to include hundreds of new terms covering many branches of modern naval endeavor.

The 377-page dictionary is broken down into four sections: terms, aircraft designations, enlisted ratings and ship designations.

The dictionary can be purchased for $5.50 from the U.S. Naval Institute, Annapolis, Md. 21402.

SecDef McNamara Cites Progress of DOD Small Business Program

[The following is the statement of Secretary of Defense Robert S. McNamara before the Select Committee on Small Business of the U.S. Senate made on March 14, 1967.]

When I appeared before this Committee on April 25, 1961, I stated:

"Based upon my former association with a very large company, I am well aware of the advantages which a competent small business can offer its customers. A good, small firm can provide flexible and responsive engineering, low administrative costs, and first-rate products."

This is still my opinion and the record of the Defense Department in increased awards to small firms both at prime and subcontract level reflects that we have done something about it. As a result the small business community has received a substantial increase in the percentage of prime contract awards as compared to the total value of all prime contracts. This is shown in the following table:

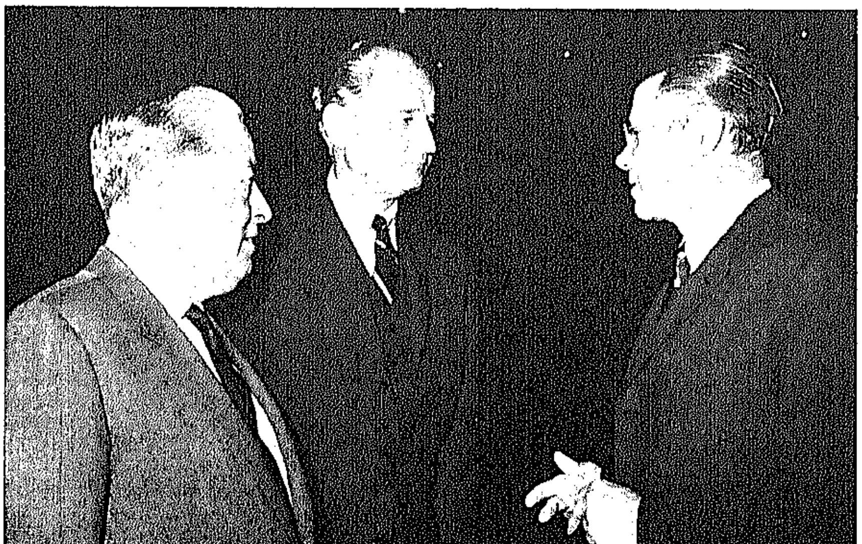
Prime Contract Awards
to Small Business

Year	Percentage
1961	16.3
1962	18.2
1963	16.5
1964	18.0
1965	20.3
1966	21.8

Small business firms have also received an increase in the percentage of subcontract awards as compared to the total value of subcontracts awarded by our primes. This is shown in the following table:

Subcontracts Awarded
to Small Business

Year	Percentage
1961	37.2
1962	38.0
1963	38.0
1964	39.1
1965	41.5
1966	41.9



Secretary of Defense Robert S. McNamara with (left to right) Senator Joseph R. Montoya (D., N.M.), Chairman, Subcommittee on Government Procurement, and Senator George A. Smathers (D., Fla.), Chairman, Senate Select Committee on Small Business, following his appearance before the Committee, March 14, 1967.

I would like to make a few brief observations concerning the Government's overall objective in sponsoring a small business program. It is my view that the objective of the Federal Government—through all of its Executive Agencies—should be to encourage the initiation of new enterprises and follow policies that foster growth during the early critical years in the life of the business. Each business should know that it can take this risk without the fear of being "squeezed out" by giants of industry, and that our Government will provide reasonable safeguards to protect it from unfair competition. Obviously, this is not the job of any one agency, but that of many agencies. In the Defense Department we contribute in several ways.

- We set aside contracts for exclusive competition among small business concerns.
- We maintain a staff throughout the country whose efforts are devoted to assisting, counseling and, on occasion, "standing up for" small business firms.
- We do our best to see that small firms get a fair proportion of defense work.

Whether we always make a useful contribution by the mere award of a contract is obviously open to question. As you know, not all contracts are profitable. Hence an over-zealous program of seeking out contracts to be awarded to small business concerns involves the risk of doing more harm than good in selected instances. We believe in providing opportunities—not subsidies. We have a strong conviction that in working toward better defense programs, we should deal only with responsible prospective contractors—whether they be large or small. Contract awards to concerns of marginal capabilities can lead only to delays or failures to obtain delivery of needed items and to higher ultimate costs to the Government. Importantly, the Armed Services Procurement Regulation requires an affirmative determination that the prospective contractor is responsible before any contract award may be made; there must be a positive judgment that he will perform the contract on schedule in accordance with its terms. This excludes the company whose qualifications are substandard as to production capacity, financial capability, or past performance.

I am sure that there is, in general, little disagreement over the importance of adhering to this principle. Small Business Administration and Defense Department representatives follow it in actual practice. I am glad to report that we have a very fine relationship in this regard.

I should like to make one additional observation. Any society which limits the opportunities for economic activity by the individual will be losing a good deal of ability and talent. It is important in a free enterprise economy that the centers of initiative be increased and the supply of enterprises ensured. We all are familiar with cases where small firms with new and imaginative ideas have come up with products which made our big systems work. The fact that individual citizens have the opportunity to put their ingenuity to work benefits us all.

Configuration Management in the Navy

(*Continued from Page 7*)

of Navy material items and the diversity of their mode of entry into the defense inventory, the depth and timing of these audits will vary. Audit requirements will vary depending on the item's work breakdown structure level and the specific base line in the life cycle at which the audit is accomplished.

The three generic types of defense material that will predicate a specific pattern for configuration audit are:

- Items developed at Government expense in meeting military requirements or items developed under Government specification.
- Items carried through engineering development at private expense under private specification.
- Commercial items, including those developed completely at private expense.

The majority of audits scheduled prior to hardware availability will be accomplished at the particular point in the item's life cycle identified as its functional base line (see Figure 1). The technical description at this base line is the definitive initial statement of the functional characteristics of the applicable item.

The hardware and its achieved functional characteristics will be audited against the technical description, which records the needed physical and functional characteristics. It is recognized, however, that a total weapon system, and its system segments, are frequently too complex to permit auditing as a whole all of their physical and functional characteristics. Accordingly, these may be audited by conducting individual audits of the lower breakdown structure elements. In such cases, physical inspections and functional tests of the lower level elements will be supplemented by necessary higher level technical reviews and demonstrations such as system operability tests, technical approval demonstrations, or performance checkouts.

Section VIII, Contract Provisions, requires that appropriate provisions for configuration management shall be included in all contracts or in-house equivalents for the development, production, modification and maintenance of Navy material items. In these provisions, consistency of configuration management objectives and procurement practices must be maintained in accordance with the manual.

Configuration management, as a concept and a discipline, will be applied in accordance with the provisions of the manual to all relevant Navy material items or configuration elements being newly procured for use by DOD, through either a contract or an internal agreement with in-house capability. It will also be applied to those Naval warfare systems already in the Navy operational support inventory, on which case-by-case decisions shall be made, based on the availability of resources and the proven need for configuration management improvement. In any case, its application will be carefully tailored to be consistent with the quantity, size, stage of life cycle, nature, and complexity of the item involved.

Film on USAF Contractor Performance Available

"Air Force Contractor Experience List," a 20-minute 16mm black and white film which explains the Air Force's program for identifying contractors who are performing unsatisfactorily, is now available on a loan basis.

The identification program described in the film was implemented to give substance to the Defense Department policy of insuring that Government activities deal only with fully qualified and capable suppliers.

Loan requests for the film should be submitted to the Director of Procurement Policy, Headquarters, U.S. Air Force, Attention: Colonel Clifford Taylor, AFSPDPA, Room 4B252, The Pentagon, Washington, D.C. 20301.

Disposition of Program Material Explained

Contractors frequently seek clarification concerning the application of paragraph 5k, Industrial Security Manual for Safeguarding Classified Information (ISM) (Attachment to DD Form 441), in connection with disposition of classified material related to a contract, program, or proposal.

One question often raised is at what point in time do the provisions of paragraph 5k apply to the classified material related to a user agency program. Another is whether or not paragraph 5k applies to superseded classified program documents of a program that is still in progress.

The provisions of paragraph 5k would apply when the contractor's participation in the particular program is ended, either through his action or that of the user agency concerned. In such case, it is up to the user agency, which furnished the classified material, to provide the contractor with disposition instructions and to advise the cognizant security office of that fact. If the contractor does not have disposition instructions, the contractor must either destroy the material or obtain retention authority.

In the case of superseded classified documents pertaining to an active program, the contractor is required to do one of the following: destroy the material in accordance with paragraph 19, ISM; request authority to retain it in accordance with paragraph 51, ISM; or return the material when requested by the user agency concerned. Where the user agency specifically directs the destruction of a superseded edition of a classified document, such as by a notation on the latest edition, the contractor shall destroy the classified material.

Retention authority is not granted for an "indefinite" period of time.

AVCOM To Hold Briefings for Industry

More than 700 guests from the aviation and associated industries and the Federal Government are expected to be on hand for the second annual Army Aviation Materiel Command (AVCOM) Advance Planning Briefing for Industry, June 19–21, at the Chase Park Plaza Hotel, St. Louis, Mo.

The event is being co-sponsored by AVCOM and the Lindbergh Chapter of the Army Aviation Association of America (AAAA). Gene Loveland, Lycoming Technical Representative, is general chairman of the briefing again this year.

The entire session this year will be classified Confidential. The Army Electronics Command is expected to participate with presentations on avionics.

Contract Administration Problems

by

James A. Walsh

A few generations ago when life seemed simpler, the word "problem" was suggestive of mathematical procedures subject to objectively precise solution. Before the "new math," folks considered that two plus two equalled four and that this was pretty much the way things should be. One could expect that by the use of time-tested formulae, one could have answers nicely packaged with no loose ends or complications.

Nowadays, we tend to be more complex in our mental processes, living as we do in an era dominated by the teachings of Freud, Jung, Adler, their disciples and doctrinal descendants. In our epoch, many people seek guidance from their analysts more frequently than from their ministers, priests, or rabbis, and we tend to view everything from the subjective aspect so that the word is considered more as Webster now defines it: "a source of perplexity or vexation."

The manner by which contracts, born as normal children of a meeting of the minds of industry and Government, quickly grow into monsters is, as Anna's King of Siam would say, a puzzlement. The dockets of the various Federal contract adjustment boards and courts bear strong support to the suspicion that there are almost as many administrative problems, Government vis-a-vis industry, as there are contracts. Although not every Government contract is a step on the high-road to litigation, the percentage of those which do go to dispute is alarming.

Yet, it is not too extravagant an oversimplification to say that the Administration Contracting Officer (ACO) has only two problems once the instrument is executed. He wishes to obtain the product called for and to receive it on time. Oddly enough, the supplier has but two problems: to make the item in accordance with drawing and specification requirements, and to get the Government to accept (and consequently pay for) it. Very optimistically, it might be said that if we can solve these, we have removed the most prolific source of ulcers in Government-industry relations. It would be nice if it were possible to make such an excision, using only the scalpel of common sense.

Those masters of political wisdom whom we call our founding fathers had a clarity of vision given to few to aid them in drafting the instruments declaring our freedoms and preserving them in our Constitution. In following their guidance with respect to military matters, we have avoided domination by military castes and by munitions-making cartels. In all of our conflicts, American industry has enabled our Armed Forces to meet the challenges of supply and logistics; not always with outstanding ease or facility since the periodic necessity of changing to a posture of defense from one of peace is necessarily more difficult to a democratic nation to which large standing armies and private "merchants of death" are abhorrent.

It is also repugnant to our democratic principles to permit excessive profits to be made from defense supply so that profits for most types of contracts are limited by statute and regulation. By the same token, it is very much consistent with American ideas of free enterprise to permit fair profits in return for performance. While defense contractors generally are moved with motives of patriotism since, in many cases, profits in private business can be much greater, they must necessarily be interested in monetary rewards if they wish to survive. It can be fairly stated, then, that the defense contractor and the Government meet at arm's length but in an atmosphere of good will in approaching contract execution.

James A. Walsh is Asst. Chief Counsel for Procurement Law at the U. S. Army Munitions Command, Dover, N. J. He has had 20 years of Government service in previous assignments as Procurement Chief, Contracting Officer, and Counsel with the Picatinny Arsenal. He holds A.B. and LL.B. degrees from Fordham University. He was admitted to the New York Bar in 1936 and practiced law in New York until 1943.

The first step is the Government's. The Procurement Contracting Officer (PCO) must make known to prospective bidders, by clear and unequivocal drawings and specifications, what he wishes to buy and to state when and where he desires that it be delivered. Simple? It would seem so. Each of the bidders, one of whom will become the contractor, must study the drawing carefully, decide how to make the item, make up and price his bill of material, line up his subcontractors, add his labor and other costs, overheads and, most important, profit. If he is the lowest responsible bidder, he receives the award. Nothing to do but perform and collect the dough.

Unfortunately, it is most discouraging how many pitfalls lie in the path of the contracting officer and the prospective contractor in taking the few steps we so blithely described as simple. In far too many instances the documents have barely arrived at the desk of the ACO when there are al-

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Room 3B 200, The Pentagon
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Authorized DOD contractors and grantees may obtain these documents without charge from:
Defense Documentation Center
Cameron Station
Alexandria, Va. 22314
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Longlines Leasing In Hawaii Centralized in Honolulu

The DOD Defense Communications Agency (DCA) has opened a single, consolidated Defense Commercial Communications Office (DECCO-Pacific) in downtown Honolulu, Hawaii, to effect centralized procurement of longlines leased communications service in Hawaii. The establishment of the DECCO-Pacific Office in Honolulu placed its functions in close proximity to the Hawaiian Telephone Co. and other commercial common carriers in Hawaii. Previously these functions had been handled through a number of military installations in Hawaii.

The expansion of voice and record communications automatic switching capability in Hawaii developed a DOD requirement for a centralized leasing activity similar to the Defense Commercial Communications Office (DECCO) at Scott AFB, Ill. DECCO is responsible for leasing and fund management for all long-haul DOD and Federal Aviation Agency commercial communications within and emanating from the continental United States.

DECCO-Pacific responsibilities and objectives may be summarized in the following three tasks:

- To carry out the longlines leasing responsibilities assigned to DCA by the Secretary of Defense.
- To insure a uniform response to DCA instructions for contracting, engineering and financial management of the switched networks.
- To obtain all possible economic advantages under current and future bulk rate tariffs through centralized management and ordering procedures.

Since the DECCO-Pacific Office opened last fall, the Automatic Digital Network (AUTODIN) Switch at Wahiawa, Hawaii, became operational on April 3. Another automatic switch, the Automatic Voice Network (AUTOVON) Switch, is expected to be installed in late 1968.

The leasing tasks associated with the switched networks and other private line services are typical of the activities of DECCO-Pacific. In reality they encompass procurement actions formerly accomplished by the individual Military Services in Hawaii. By March 1967, DECCO-Pacific had assumed responsibility for over 800 Communications Service Authorizations (CSA's) with an annual dollar expenditure of over $2 million.

Monthly bills submitted by the carriers and noncarriers are mailed to DECCO at Scott AFB and matched against the financial records in the computer data base. If a matched condition is reached, a computer-generated voucher is used to document payment to the respective carriers. Unmatched conditions attributed to DECCO-Pacific computer inputs have been averaging less than one-half of one percent each month for the 800 bills received. The accuracy of the DECCO-Pacific input has enabled DECCO to process and pay for leased services in Hawaii within 72 hours.

The objectives of DECCO-Pacific are gradually becoming a fact. Transfer of leasing actions, formerly handled by the three Military Services, is being accomplished as fast as the details are worked out. New service leasing is being accomplished in a timely manner to meet the service date requirements of the validating offices. The next step is to apply bulk pricing wherever possible and reduce the overall on-island communications cost to the Government.

DECCO-Pacific is managed and operated by one officer and four civilians. The chief of this field activity is Captain Eugene Morris, USAF.

Research in the Air Force

by

Brig. Gen. Ernest A. Pinson, USAF

Research and development is one of the mightiest forces for progress within the American economy and a vital force for national defense and national survival. For a nation so deeply committed to the machine, the magnitude of America's effort in technology is not surprising.

Unfortunately, however, a substantial number of Americans forget the great amount of basic research that has made possible the current technological explosion. Many people do not fully realize that this explosion has carried us to the frontier of human knowledge—that every technological advance faces us with unknowns that must be solved before we can proceed further. The solutions to these unknowns can only be discovered by creative scientists through fundamental research into the nature of the world we live in and how things function.

Scientists, engineers and managers know that the Air Force's capability to accomplish its mission is vitally affected by technological progress. This is true today and will be even more so in the future.

Since technological progress is dependent upon new scientific knowledge, it is mandatory that the Air Force be involved in a vigorous and dynamic research program that is relevant to both current and future needs.

To name a few, these needs include airborne, real time display techniques for night reconnaissance and attack; high temperature superconductors; lightweight, strong filaments; laser and superconductor applications; controlled nuclear fusion; higher energy, non-nuclear explosives; vortex flow applications; and lightweight, compact supersonic compressors.

Another very important requirement for the Air Force was brought on by the tremendous advances made and being made in computer processing technologies. We need comparable advances in operations analysis—a more powerful body of science for real time decision making in command and control must be developed.

Seeking this new scientific knowledge is the mission of the Office of Aerospace Research (OAR), the research agency of the Air Force, located in Arlington, Va. To accomplish this mission, OAR scientists are now working in important scientific disciplines that did not exist a quarter of a century ago. They are asking questions that could not have been asked then. In many instances the vocabulary in which to ask them did not even exist.

As the prime research agency of the Air Force, OAR is a separate operating agency. We report directly to Air Force headquarters. We are on the same level of command as the combat commands, and the Logistics and Systems Commands. I mention this only to emphasize the importance the Air Force places on research.

We are, however, a small organization with only 1,937 assigned personnel, two-thirds of which are civilians.

To accomplish our research objectives we have three in-house laboratories, plus the Air Force Office of Scientific Research and the Office of Research Analyses.

In addition, we have a European Office in Brussels, a Latin American Office in Rio de Janeiro, and field detachments at Patrick AFB and Vandenberg AFB, and in Los Angeles.

Brig. Gen. Ernest A. Pinson, USAF, is Commander, Office of Aerospace Research, Arlington, Va. Prior to assuming command of OAR in February 1965, he served as Dep. Commander and before that as Vice Commander, Air Force Cambridge Laboratories, Mass. He holds an A.B. degree from Depauw University, a Ph.D. in Medical Physiology from the University of Rochester, and a Ph.D. in Physics from the University of California. Gen. Pinson was nominated for promotion to major general on March 7.

Our largest laboratory—the Air Force Cambridge Research Laboratories (AFCRL), Bedford, Mass.—is the focal point for research in the environmental sciences and provides a major in-house facility for research in the physical and engineering sciences relating to geophysics. They also do exploratory development work in geophysics which means simply that they carry their research into the development stage in these areas.

Because of their unique facilities, scientists at AFCRL conduct sizeable programs for the Air Force Systems Command, National Aeronautics and Space Administration, the DOD Advanced Research Projects Agency, and the Defense Atomic Support Agency.

The Aerospace Research Laboratories (ARL), at Wright-Patterson AFB, Ohio, conduct in-house research programs in the physical and engineering sciences. ARL also plays a significant role in the professional development of Air Force officers through its interface with the Air Force Institute of Technology (AFIT). The facilities of the laboratories are made available for graduate students at AFIT working toward advanced degrees. In addition, scientists at ARL teach at AFIT.

Featuring research in chemistry, mathematics and aerospace mechanics, The Frank J. Seiler Research Laboratory at the Air Force Academy is unique in that it allows instructors and cadets at the academy to work on research projects while extending the scientific education of the cadets. This provides a research environment that will influence talented cadets to follow a research and development career in the Air Force.

The Air Force Office of Scientific Research, co-located with OAR headquarters, in Arlington, Va., is the broadest in research scope of any OAR activity. Through its grants and contracts program, this office covers every element of scientific research. Its contracts with the scientific community, primarily through educational institutions and with individual scientists, cover most of the free world.

The Office of Research Analyses, Holloman AFB., N. M., is responsible for systems, technical and mission analysis. This office conducts systems analysis to determine the technical validity, operational feasibility and cost effectiveness of proposed future aerospace weapon system concepts. It

also conducts applications studies for some of our research.

The European Office of OAR is the on-the-spot broker for research in Europe, Africa and the Near East. Its customers are OAR, the Systems Command and DOD. It has no budget of its own. The money it spends for research comes from 17 different organizations in the United States. The Latin American Office performs a similar function in South America.

A very important activity of OAR, the Aerospace Research Support Program, is frequently the gateway to space for DOD scientists and engineers. This DOD program is managed by OAR and designed to provide the Army, Navy, or Air Force experimenter with the necessary hardware to get his experiment into the space environment. This includes the use of rocket boosters and satellites purchased with OAR funds. We confine this program to support of research and exploratory development in space as compared to advanced and engineering development programs.

To accomplish our research we have a five-year plan, reviewed and revised annually. It is a requirement plan that includes projections of resources such as facilities, manpower and funds necessary to adequately support our research. It is prepared to correspond to the time period related to the DOD Force and Financial Plan.

In addition to the five-year plan, we publish annually our research objectives. Authorized contractors and grantees can obtain this document from the Defense Documentation Center, Cameron Station, Alexandria, Va. 22314. The Clearinghouse for Federal and Scientific Information, Department of Commerce, Springfield, Va. 22151, also has the document for sale at $3 per copy for those individuals not eligible to receive material through the Defense Documentation Center.

Theoretically, we should conduct Air Force research across the whole spectrum of the sources of human knowledge. Practically, we must limit ourselves to the areas where we can most logically expect to find answers of value to the Air Force.

We call this relevant research. This includes research for new fundamental knowledge in the physical, environmental, engineering and life sciences.

I would like to emphasize that individual research contracts and grants are generally small, compared to the large sums expended on exploratory and applied research and development. We seek to buy brain power to supplement our in-house capability.

Contractors do not need large facilities to compete for this type of work. Proposals of Air Force interest are selected on the basis of originality and the caliber of the principal research investigator.

Research projects supported by OAR open vast areas of investigation and are repeated reminders that, while basic research can be programmed by management, discoveries and significant breakthroughs cannot.

Continually, however, we see Air Force research yielding rich returns along lines of Air Force interest.

OAR scientists conducted the initial studies and established the technical feasibility leading to the design and construction of the Over-the-Horizon Detection System.

Our scientists also performed the initial research and later supported the basic work which provided the foundation for the phased array and frequency scanning antenna systems which have proved of great significance to the military for future ballistic missile defense and for communications satellites.

We are doing considerable research on clear air turbulence. We are studying lasers, and microwave radiometers as possible warning devices. This is especially important in the age of supersonic aircraft.

Research has confirmed the feasibility of supersonic combustion at both relatively low as well as high supersonic Mach numbers. The way is now open for future development of a ramjet capable of a wide range of speeds up to and including orbital velocity.

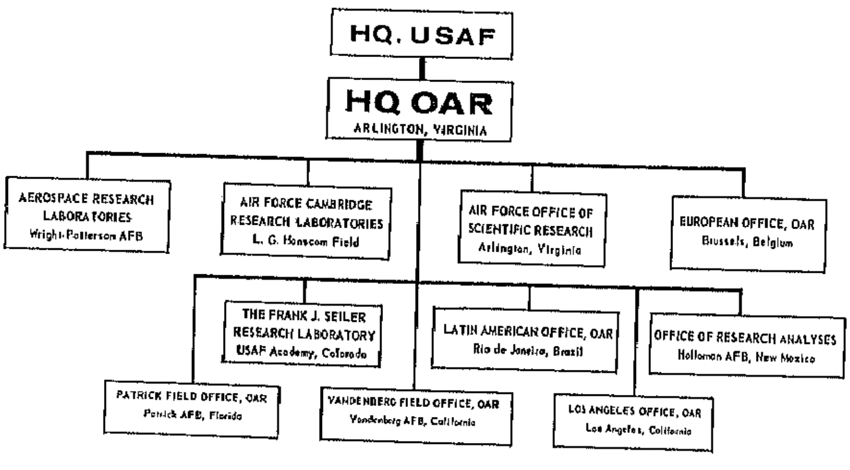
Research in energy conversion involving fluid dynamic processes has led to new concepts for the separation of solid and liquid particles from gases. Such a device is now possible for use as a dust separator for the intakes of jet engines powering aircraft and helicopters, and will greatly increase the efficiency and operational capabilities of these vehicles in dusty areas. This separation process may be useful in designing nuclear power sources.

Rapid identification of disease-producing bacteria is now possible by use of an OAR contractor-developed gas chromatographic technique. Bacterial metabolic products provide the information source for the chromatogram tracing. This tracing produced by each strain of bacteria differs significantly; thus we now have a "fingerprinting" technique for disease germs. Such a device will prove especially useful in hospital diagnosis, air and water pollution studies, search for life on other planets, and in biological warfare detection.

OAR scientists, having already found a practical method for dispersal of cold fog, are now working on a method for warm air fog dispersal which would be of special benefit to the Air Force in tropical areas such as Southeast Asia.

The discovery of the first chemical laser came as the result of an OAR university grant. Aside from its obvious research value, a chemical laser, unencumbered by ponderous banks of condensers and heavy electrical generating systems, has enormous potential in space communications, and for satellite detection and

(*Continued on Page 34*)



The Contract Messmen Program Shifts into High Gear

by

Earl Nichols

At a time when the strongest emphasis is being place on the country's need to use civilians for tasks which will free military personnel for more urgent duties, the Navy's experience with the "civilianizing" of Navy shore messes is receiving studied attention.

The work in the messes of some 37 Naval activities is now being performed by civilian personnel or under contract. This involves the replacement of about 2,500 military personnel with civilians. An additional 18 facilities are being surveyed and are expected to be contracted for within the next 12 months, which would replace about 500 more military personnel. These changes are being carried out under the Contract Messman Program.

The Contract Messman Program, although it was developed by the Navy several years before DOD initiated its civilian substitution policy, had the same basic goal—to better utilize military personnel by replacing military with civilians in certain jobs. Under the program, contracts are made with private service companies to supply civilian personnel to perform mess functions at Naval installations ashore which are usually assigned to unrated military trainees. These functions were initially limited to scullery work, keeping floors and tables clean and polished, sanitary care of halls and bathrooms, garbage removal and receiving deck work. The program has since been expanded to include some food handling jobs.

The Navy Subsistence Office, which administers the program under the direction of the Navy Supply Systems Command, acknowledges that the program has been beset with problems, some of which continue to plague its administration. An installation's personnel must be fed and fed on time, and any disturbance in the performance of a contract affects that basic service and becomes a serious morale problem.

The Navy Subsistence Office notes that the program possesses the attributes of the fabled little girl who when good "was very very good and when she was bad she was horrid." Despite the problems, the program works and is being expanded. The need that existed to release military personnel for other duties is even more urgent today than when the program was begun.

The Contract Messman Program originated from a memorandum which the Assistant Secretary of the Navy (Personnel and Reserve Forces) addressed to the Chief of Naval Personnel in August 1960 requesting a survey into the possibility of better utilizing Navy manpower by contracting with civilian firms to supply messmen for Naval activities ashore. A feasibility study was made and the program determined to be possible. In early 1962, pilot programs were begun at Naval Air Station, Quonset Point, R.I., and Naval Stations, Newport, R.I., and Washington, D.C.

Over a two-and-a-half-year period, the pilot programs proved successful operations. This does not mean that all went smoothly. On the contrary, several problem areas became apparent early in the program. Inept contractors, weak contract specifications, and a few instances of poor rapport between contractors and Navy management personnel enlivened the test period. Despite these and other difficulties encountered, the program was evidently workable.

Earl Nichols is a staff writer with the Publications & Technical Information Div. of the Naval Supply Systems Command. The Navy Subsistence Office, which administers the Navy food service program, is an activity of the Naval Supply Systems Command. Mr. Nichols holds a B.A. degree from Queens College, New York, N. Y.

In late 1964, in response to the support given the program by the Chief of Naval Personnel, Vice Admiral B. J. Semmes, DOD approved it on the basis of the savings inherent in the program. The Bureau of Supplies and Accounts was authorized to direct its implementation. By Jan. 5, 1965, 23 activities had contracted for mess non-food handling services to be performed by civilians.

The Navy Subsistence Office anticipated a two-and-a-half-year period during which problems might be evaluated and brought under better control. However, the program was barely under way when it received impetus from two directions. In October 1965, DOD announced its civilian substitution policy. At the same time, demands for trained military personnel were immensely sharpened by requirements in Southeast Asia. Naval facilities, particularly the large Naval Training Centers and the Naval Construction Battalion centers, were under great pressure to provide trained personnel as quickly as possible. Commands could no longer afford to use 90 days of a trainee's time in mess duties when there was such urgent need to train him into a rating and have him fill a billet immediately. Accordingly, a number of facilities sought the use of civilians in their messes and several began using them in food handling jobs. Thus the program was suddenly expanded in terms of numbers and with respect to the skills required for some jobs.

The scope of the contract messman program was further broadened when a Navy board on the retention of personnel, headed by Rear Admiral John Alford, recommended in 1965 that the Navy "expand the contract messman program to include all shore activities" in the continental United States.

This brings into consideration one of the limitations on the program—installation size. The program had been found workable in larger messes. However, about half of the Navy shore messes are not of a size which would justify contracting for 20 or more civilians, the minimum

number for which a contract can be satisfactorily negotiated.

Another limitation on the program is the need to maintain Navy commissarymen (cooks) in shore installations. To replace these Navy enlisted men with civilians would eliminate many shore billets and force commissarymen to spend their entire Navy careers aboard ship. This would be contrary to established personnel retention policy to rotate personnel between ship and shore assignments and would affect the morale of Navy commissarymen. Civilian employees are utilized in some installations for counter service, salad preparation, and in other food service capacities, but not as cooks.

The effectiveness with which a contract is fulfilled by a contractor is influenced by diverse factors, including area unemployment rates and the attitudes of contractors.

Experience has shown that the unemployment rate in the area where a contract is let generally affects the quality of performance by the contractor. Where the unemployment rate is low, contractors are forced to draw on less skilled and less reliable persons, and personnel problems occur more frequently. Personnel problems diminish greatly when the area concerned has a high unemployment rate.

One of the obstacles to successful operation of a messman contract is a lack of understanding on the part of contractors as to the standards which the Navy maintains, and expects to be maintained, in its facilities. Firms bidding on the contracts are generally oriented to providing a janitorial-type service, rather than to food service, and there is sometimes a lack of proper supervision of the nature needed. Both contractors and employees often have to go through a period of re-education, and this can be a time of considerable strain during which personnel problems are not uncommon. Personnel problems have included excessive absenteeism, production slowdowns, walkouts and sitdown strikes. It must be admitted that military personnel have sometimes failed to use the best management techniques in coping with civilian employee problems, often due to a lack of experience in dealing with civilian help.

In mid-1966 two adjustments were made in the contracts which have raised the quality of performance:

• Contractors are now required to pay employees on the basis of an area wage survey conducted by the Department of Labor. This curbs the tendency of marginal contractors to draw on the lowest sector of the labor community and generally raises the quality of employees provided to Naval facilities.

• The utilization of women has definitely raised the level of work performance and decreased the severity of personnel problems. Women were not used under the early messman contracts because Naval activities were reluctant to introduce women into stations with an all-male population and some were not equipped with facilities to accommodate women. However, in April 1966 a contract was negotiated for the Naval Air Station at Mirimar, Calif., which included a dispensation to utilize women and recommended this be done. The results were so successful that contracts let in July 1966 omit any reference to the employment of women. The Navy Subsistence Office encourages the hiring of females by contractors and strongly urges all activities to provide facilities for their employment.

That is the program to date, the problems attendant upon it, and the major improvements which have increased its effectiveness. What does the future hold for the program? What other avenues can be explored to upgrade work performance and to "de-bug" it in problem areas?

• The Navy Subsistence Office is compiling data on problem areas which consistently appear. Some difficulties can be reduced by purifying and updating contract specifications and by seeking out ways of raising the quality, standards and performance of Navy mess civilian employees.

• The Navy is continuing its efforts to interest food service firms in participating in the program. In the past, established food service contractors have generally avoided bidding for messman contracts. One reason they were reluctant to bid is that contracting, in conformance with the Armed Services Procurement Regulation, is on an annual basis. Reliable food service firms cannot build effective service in a year's time. With no assurance that they would receive subsequent contracts, they simply avoided bidding. The Navy Subsistence Office has now been given authority to permit one-year contracts with extension options. Also, food service firms are geared to handling an entire food package—purchase of the food, its preparation, and food service. There have been indications that such companies might be interested in messman contracts if these were offered on a complete package basis. The next 18 months should see the expansion of the program to its limits under existing policy. It is possible that, as the program grows and assumes permanent status, some food service firms will decide to participate.

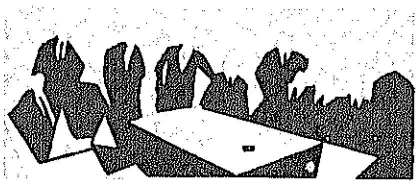
• Consideration is being given to providing training for the civilian employees to help orient them toward Navy practices and standards. Under such an arrangement, the contractor would have to assume responsibility for paying the employee while being trained.

• The Navy has under consideration providing the physical examination which each employee must have before working in a Naval facility. From the Navy point of view, this would be preferable to accepting a physician's report from the employee.

An alternative to contracting out the messman service would be the use of Civil Service personnel. While this is a direction which may be further explored, the cost is believed to be prohibitive.

Despite the problems which have challenged the program from its inception, the results have shown that the program works. Out of some 50 contracts negotiated to date, only two had to be canceled because of defaults in performance. The Naval Air Station, Miramar, Calif., has efficiently incorporated its civilian contract workers into an operation which won for the station the coveted Ney Award for excellence in food service in 1966.

Captain E. A. Hamblen, Commanding Officer of the Navy Subsistence Office, believes that the program is achieving its goals. "Certainly it has helped release Navy personnel to posts where they can be more effectively used," he said. "Both in terms of manpower utilization and on the basis of fiscal savings, the contract messman program is doing the job for which it was intended. Our major aim now is to upgrade its effectiveness at the same time that we increase its scope."



MEETINGS AND SYMPOSIA

MAY

Annual National Colloquium on Information Retrieval, May 3-4, at the Hotel Adelphia, Philadelphia, Pa. Contact: STINFO Project Director, A 2100, Frankford Arsenal, Philadelphia, Pa. 19137 (Area Code 215) JE 5-2900, Ext. 3219.

Sixth Rare Earth Conference, May 3-5, at Gatlinburg, Tenn. Co-sponsors: Air Force Office of Scientific Research and Oak Ridge National Laboratory. Contact: Dr. Anthony J. Matuszko (SRC), Air Force Office of Scientific Research, 1400 Wilson Blvd., Arlington, Va. 22209, (Area Code 202) OXford 4-5337. Program contact: Dr. W. C. Koehler, Solid State Div., Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, Tenn. 37831.

14th Annual Institute on Government Contracts, May 4-5, at Washington, D.C. Co-sponsors: George Washington University and the Federal Bar Association. Contact: 14th Annual Institute on Government Contracts, Federal Bar Assn., 1815 H St., N.W., Washington, D.C. 20006.

International Conference on the **Mechanics of Composite Materials,** May 8-10, at the Marriott Inn Motor Hotel, Philadelphia, Pa. Sponsor: Office of Naval Research. Contact: Ted Ryan, Space Sciences Laboratory, Conference Coordinator, (Area Code 215) 969-2954; or J. M. Crowley, Office of Naval Research, Code 439, Main Navy Building, Washington, D.C. 20360, (Area Code 202) OXford 6-2283.

Electron, Ion and Electromagnetic Beam Symposium, May 9-11, at the University of California, Berkeley, Calif. Co-Sponsors: Office of Naval Research and the University of California. Contact: Lt. Ronald Troutman, Office of Naval Research, Code 427, Room 4102, Main Navy Building, Washington, D.C. 20360, (Area Code 202) OXford 6-2289 or 6-4301.

Photo-Optical Systems Evaluation Seminar, May 11-12, at Sheraton Hotel, Rochester, N.Y. Co-sponsors: Society of Photo-Optical Instrumentation Engineers and the Air Force Systems Command. Contact: John F. Carson, Chairman, SPIE Seminar Program Committee, 65 Plymouth Ave. S., Rochester, N.Y. 14608.

Conference on **Expandable and Modular Structures for Aerospace Applications,** May 15-17, at the Carillon Hotel, Miami Beach, Fla. Sponsors: Air Force Aero Propulsion Laboratory, Space General Corp. and GCA Viron Div. Contact: Fred W. Forbes (APFT), Air Force Aero Propulsion Laboratory, Wright-Patterson AFB, Ohio 45433, (Area Code 513) 253-7111, Ext. 52771.

21st Annual **Power Sources** Conference, May 16-18, at the Shelburne Hotel, Atlantic City, N.J. Sponsor: Army Electronics Command, Fort Monmouth, N.J. Contact: Herbert W. Schwartz, Conference Coordinator, Power Sources Div., Electronic Components Lab., Army Electronics Command, Fort Monmouth, N.J. 07703, (Area Code 201) 535-2349.

Interagency **Data Exchange Program** (IDEP) Annual Conference, May 16-18, at Clear Lake, Tex. Sponsor: Policy Board, IDEP. Contact: Army Representative, Policy Board, IDEP, Systems Research & Development Branch, S&TI Div., Army Research Office, Office of Chief of Research & Development, Washington, D.C. 20310, (Area Code 202) OXford 4-3513.

Third **System Performance Effectiveness** Conference, May 17-18, at State Department Auditorium, Washington, D.C. Sponsor: Naval Material Command. Contact: Mr. G. W. Neumann, Executive Secretary, SPE Steering Committee, Naval Ship Systems Command, Code 03511, Washington, D.C. 20360, (Area Code 202) OXford 6-3097.

Man, Materials and Nondestructive Testing Symposium, May 21-26, at Sheraton Mount Royal Hotel, Montreal, Quebec, Canada. Co-sponsors: Office of Naval Research and British-Canadian-U.S. TriPartite Technical Group. Contact: Mr. V. G. Behal, Dominion Foundries and Steel, Ltd., P.O. Box 460, Hamilton, Ontario, Canada; or Mr. J. M. Crowley, Office of Naval Research, Code 439, Main Navy Building, Washington, D.C. 20360, (Area Code 202) OXford 6-2283.

Corrosion of Military and Aerospace Equipment Symposium, May 23-25, at Denver, Colo. Sponsor: Air Force Materials Laboratory, Wright-Patterson AFB, Ohio. Contact: Fred H. Meyer Jr., Applications Div., Systems Support Branch, Air Force Materials Laboratory, Wright-Patterson AFB, Ohio 45433.

JUNE

Conference on **High Energy Therapy Dosimetry,** June 15-17, at New York, N.Y. Sponsor: Office of Naval Research. Contact: Eunice Thomas Miner, Executive Director, New York Academy of Sciences, 2 E. 63rd St., New York, N.Y. 10021.

Computerized Imaging Techniques Seminar, June 26-27, at the Marriott Twin Bridges Motor Hotel, Washington, D.C. Sponsor: Air Force Office of Aerospace Research. Contact: Jerome I. Mantell, Chairman, 18100 Frederick Pike, Gaithersburg, Md. 20760, (Area Code 301) 921-7896.

Field Emission Symposium, June 26-30, at Georgetown University, Washington, D.C. Sponsors: Office of Naval Research, Georgetown University and the National Bureau of Standards. Contact: Lt. Ronald Troutman, Office of Naval Research, Code 427, Room 4102, Main Navy Building, Washington, D.C. 20360, (Area Code 202) OXford 6-2298 or 6-4301.

Fundamental Physics of the Magnetosphere, June (dates undetermined), at Boston, Mass. Co-sponsors: Air Force Cambridge Research Laboratories and Boston College. Contact: J. F. McClay, Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Bedford, Mass. 01731, (Area Code 617) CR-4-6100, Ext. 3218.

JULY

1967 Annual Conference on **Nuclear and Space Radiation Effect,** July 10-14, at Ohio State University, Columbus, Ohio. Sponsors: Institute of Electrical and Electronics Engineers, NASA Office of Advanced Research and Technology, Office of Naval Research, Air Force Office of Scientific Research and the Department of the Army. Contact: Mr. E. E. Conrad, Harry Diamond Laboratories, Washington, D.C., 20438, (Area Code 202) OXford 6-9126.

1967 Summer Seminar on **Mathematics of the Decision Sciences,** at Stanford University, Palo Alto, Calif., July 10-Aug. 11. Sponsors: Air Force Office of Scientific Research, Atomic Energy Commission, Army Research Office, Small Business Administration, National Bureau of Standards, Office of Naval Research, National Institutes of Health and the National Science Foundation. Contact: Maj. John Jones Jr., (SRMA), Air Force Office of Scientific Research, 1400 Wilson Blvd., Arlington, Va. 22209, (Area Code 202) OXford 4-5261.

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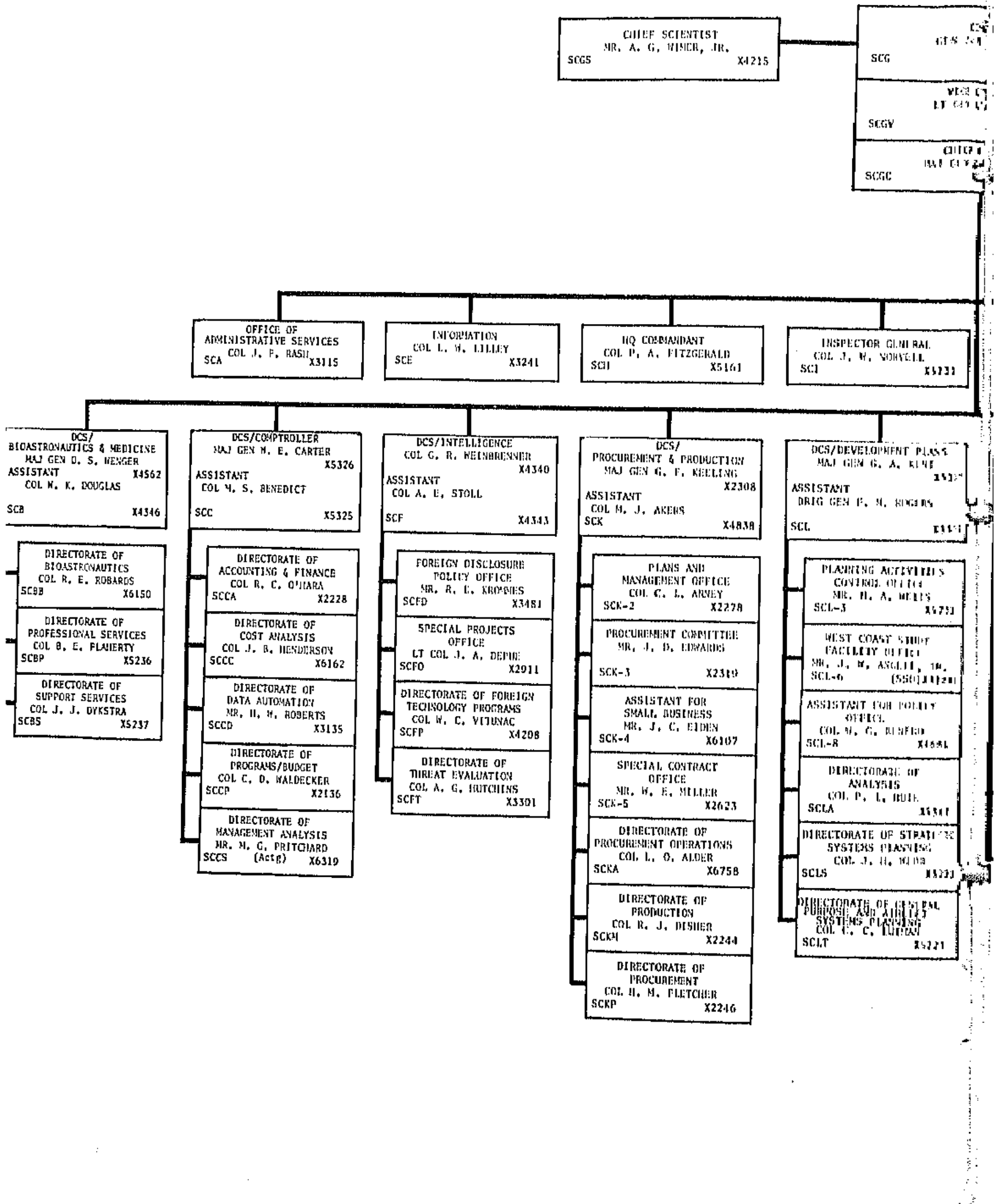

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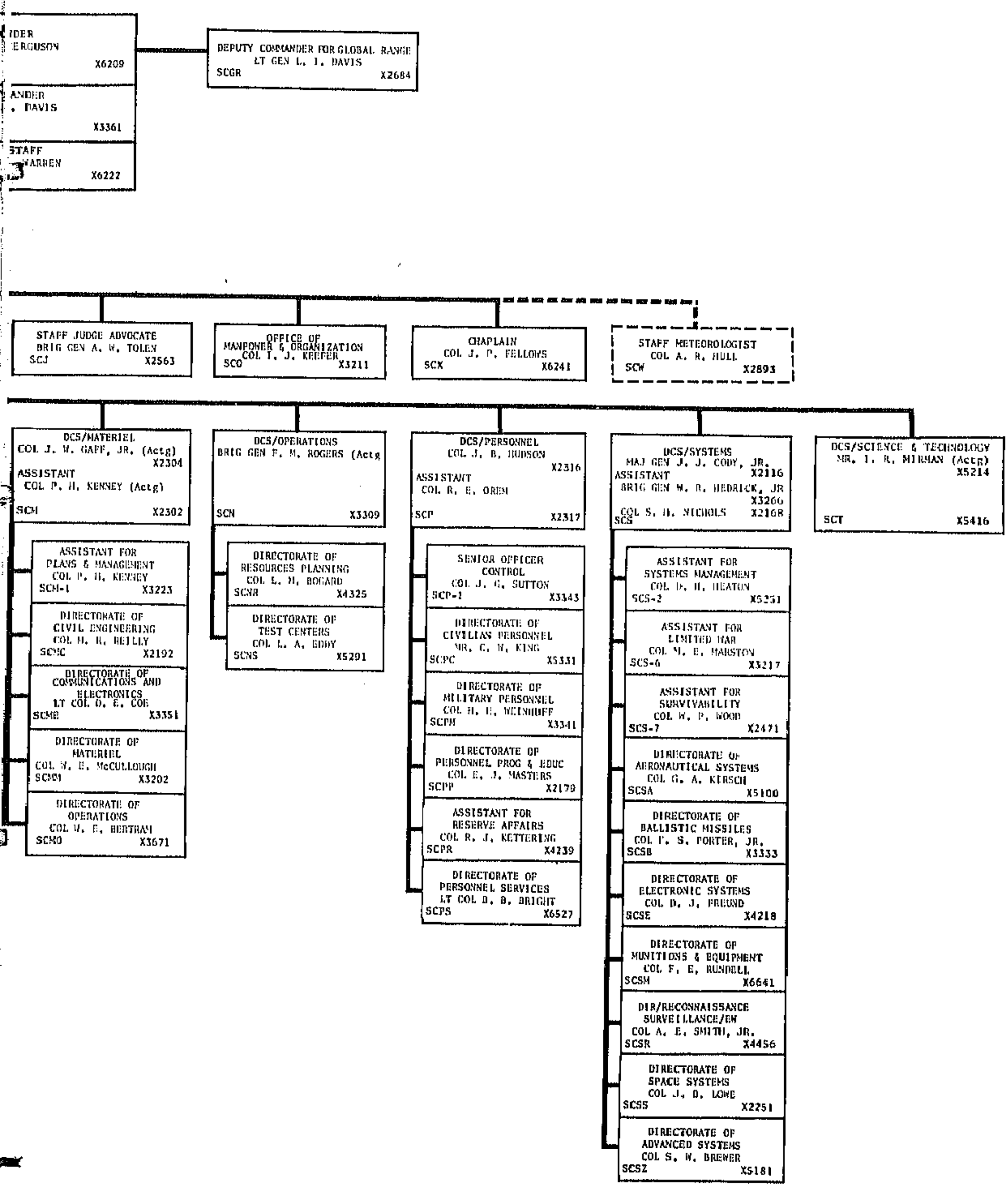

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JUNE 1967

SPEAKERS CALENDAR

DEPARTMENT OF DEFENSE

Hon. Paul R. Ignatius, Asst. Secretary of Defense (Installations & Logistics), at the 25th Anniversary Meeting of the National AeroSpace Services Assn., International Inn, Washington, D. C., May 2.

Mr. Henry A. Wallace, Los Angeles Regional Manager, Defense Contract Audit Agency, at the Aerospace and Electronics Committee of the Los Angeles Chapter of Certified Public Accountants Meeting, Los Angeles, Calif., May 25.

Lt. Gen. H. C. Donnelly, USAF, Dir., Defense Atomic Support Agency, at Memorial Day Services, Santa Fe National Cemetery, Santa Fe, N.M., May 30.

DEPARTMENT OF THE ARMY

Alfred B. Fitt, General Counsel, at Veterans Memorial Building Awards Presentation, Detroit, Mich., April 26.

Brig. Gen. Harry G. Woodbury Jr., Director of Civil Works, Office of Chief of Engineers, at American Power Conference Marketing Seminar, Chicago, Ill., April 26.

DEPARTMENT OF THE NAVY

RAdm. Henry L. Miller, Chief of Information, at Navy League Convention, Jacksonville, Fla., May 1-5.

Hon. Paul H. Nitze, Secretary of the Navy, at Jr. Chamber of Commerce Armed Forces Day Luncheon, Los Angeles, Calif., May 16.

Adm. Alfred G. Ward, U. S. Representative to NATO, at Armed Forces Week Celebration, Detroit, Mich., May 16; at Commissioning Ceremony of USS Ramsey (DEG-2), Seattle, Wash., May 27.

RAdm. P. A. Beshany, Dir., Submarine Warfare, at Kiwanis International Club, Columbus, Ga., May 16.

RAdm. James L. Abbot, Commander, U.S. Naval Support Force, Antarctica, at Armed Forces Day Celebration, Mobile, Ala., May 18.

VAdm. Alexander Heyward, Chief of Naval Air Training, at Armed Forces Council, Kansas City, Mo., May 20.

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DEPARTMENT OF THE AIR FORCE

Hon. Norman S. Paul, Under Secretary of the Air Force, at Aviation Hall of Fame, New York, N.Y., May 7.

Lt. Gen. H. T. Wheless, Asst. Vice Chief of Staff, at Aviation Hall of Fame, New York, N.Y., May 7.

Lt. Gen. T. P. Gerrity, Dep. Chief of Staff (Systems & Logistics), at American Ordnance Assn., Washington, D.C., May 11; at Inter-Agency Data Exchange, Houston, Tex., May 17.

Brig. Gen. Guy H. Goddard, Dep. Dir. for Construction, Office of Dir., Civil Engineering, at Armed Forces Day Luncheon, Akron, Ohio, May 15.

Gen. B. K. Holloway, Vice Chief of Staff, at Hennessy Trophy Awards, Chicago, Ill., May 21; at Comestock Club, Sacramento, Calif., May 22; at American Fighter Aces Assn., Colorado Springs, Colo., June 24.

Gen. K. B. Hobson, Commander, Air Force Logistics Command, at National Security Industrial Assn., Dayton, Ohio, May 24.

Hon. Robert H. Charles, Asst. Secretary of the Air Force (Installations & Logistics), at Forging Industries Assn. Meeting, White Sulphur Springs, W. Va., May 26.

Maj. Gen. R. P. Klocko, Commander, Air Force Communications Service, at Armed Forces Communications & Electronics Assn. Meeting, Washington, D.C., June 5-7.

Brig. Gen. E. A. Pinson, Commander, Office of Aerospace Research, at American Society of Photogrammetry, Washington, D.C., June 26.

Navy Offers Direct Commission To Obtain Needed Civil Engineers

The Navy has established a Direct Procurement Program to recruit experienced civil engineers for direct appointment as Navy Civil Engineer Corps (CEC) officers for active duty in lieutenant and lieutenant commander grades.

Officers procured under this program will attend a nine-week orientation course at Newport, R. I., and an eight-week course at the Civil Engineer Corps Officers School, Port Hueneme, Calif. They will serve two years on active duty and agree to remain Naval reservists for an additional four years.

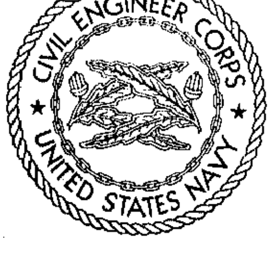
To become a reserve lieutenant, an applicant must have a baccalaureate degree in engineering or architecture, five years of acceptable experience, and be at least 26 years old. Lieutenant commanders must be 38 years old, or under, and will need the same educational background plus 12 years of experience. Graduate degrees in engineering normally count as a year of experience.

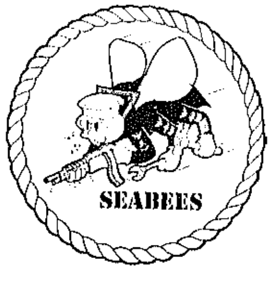
CEC officers, as members of the Naval Facilities Engineering Command (NAVFAC), build and maintain the Navy's vast, world-wide shore establishment. They also command Seabee Battalions and Seabee Teams.

Today, 17 Seabee Battalions are on active duty, eight of them deployed in South Vietnam where they support Navy activities and Marine Corps and Army combat troops. In addition, 11 Seabee Teams are performing civic action missions, eight of them in South Vietnam and three in Thailand.

Today in Vietnam, NAVFAC—designated the DOD construction agent in Southeast Asia—manages and directs, under the leadership of CEC officers, the operation of the largest construction job in world history.

The year 1967 marks the 25th anniversary of the Seabees, the 100th anniversary of the Navy Civil Engineer Corps, and the 125th anniversary of the Naval Facilities Engineering Command (formerly the Bureau of Yards and Docks.)





FROM THE SPEAKERS ROSTRUM

Excerpt from address by Maj. Gen. William J. Van Ryzin, USMC, Asst. Chief of Staff, G–4, Hq., U. S. Marine Corps, at Navy League Biennial Symposium/Exhibition, Washington, D. C., Feb. 10, 1967.

Maj. Gen. W. J. Van Ryzin, USMC

Marine Corps Logistics in Vietnam and Tomorrow

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Many of our logistic problems in Vietnam are related directly to the distance which supplies must be shipped to get to the user and the difficulties in handling and moving cargo once it is in the objective area. We have learned to live with a long pipeline—it has been 210 days from requisition to delivery for many items—but we are working hard to shorten it. The monsoon winds and rains have not only curtailed unloading operations at times but have dissolved roads, washed out bridges, flooded staging areas and generally hampered movement. The monsoons also play havoc with items that are marked or packaged poorly.

Much of the credit for improvements which we have made in this area goes to our Navy teammates in the Mobile Construction Battalions and at the Naval Support Activity, DaNang. . . .

But there are still tasks to be done and industry can help! Industry can give us better cargo handling equipment and rapid unloading systems for ships. The methods we are using today are not much advanced over those we used in World War II. We need better shipping containers and we need better packaging. The containers we want should reduce breakage and pilferage yet facilitate easy movement by helicopter, vehicle, or landing craft. Consider this problem, if you will, as it relates to the multiple handling involved in an item which must go by ship from the West Coast to DaNang, by airlift to Hue-Phu Bai, by truck to Dong-Ha, and by helicopter to an outpost for use on patrol in a monsoon rain!

The Marine Corps, like the other Services, is looking for a good soil stabilizer. We need a substance that will work as a soil stabilizer and dust pallative under all weather conditions and on all types of soil with a minimum of site preparation. It must be economical and simple to employ. The materials we now have are moderately effective in sand but don't help us very much with mud. There are many applications for such a soil stabilizer but the one that concerns us most is providing a good surface for helicopter landing zones. The dust and debris problem was difficult in "Operation Hastings" but it is especially nettelsome at Chu Lai where we installed an expeditionary airfield with aluminum matting. The matting has performed far in excess of what was demanded of it but the soil beneath the matting has degenerated. Much of the surface has had to be lifted and relaid on stabilized soil. Dust and mud are among our worst enemies.

The single item that brings me the greatest amount of "fan mail" today is rainwear. Our troops have had ample opportunity to test their rain gear during the monsoons and they aren't very enthusiastic about their present ponchos. The ponchos protect the upper torso adequately but not the lower body. There is nothing they like about the poncho. What is needed is a piece of tropical rainwear that is light and durable but which gives good coverage against the chilling monsoon rain while permitting the body to "breathe." We've tried every known commercial product but so far haven't found the item we consider acceptable.

The weather and climate of Vietnam is as hard on equipment as it is on men. Constant exposure to heat, humidity, and an especially fine type of abrasive sand found in Vietnam have combined with the constant operation of equipment to raise wear-out rates well beyond the expected level. Relentless pursuit of the enemy, firing at extreme ranges and maximum charges, and communicating with units widely separated has placed added stress and strain on both weapons and communications equipment. Replacement of many items has had to be accomplished much sooner than was anticipated and item maintenance is required more often than was expected. Industry's role here is to help us develop more rugged and reliable equipment that will withstand these adverse conditions.

I recognize that the military constantly demands higher performance from industry and we still have to achieve a meeting of the minds on maintenance requirements. The Marine Corps is working on this problem and already has launched program "Trump"—Total Revision and Updating of Maintenance Procedures.

Our communicators are still calling for better radios, better batteries, a better tactical switchboard, and greater reliability in their equipment across the board. We're still trying to beat the weight and performance problems in manpack and miniature radios. We have progressed now to the point where, in our latest equipments, the battery is of equal or greater weight than the electronic portions of the system. If you want to help us in communications, give us a long-range, reliable manpack communications system, give us a miniature, short-range, two-way radio for our rifleman, and give us a lightweight, long endurance battery to power our radios. We also need a lightweight switchboard that is automatic or semi-automatic and will successfully endure the primitive conditions of the field environment including a monsoon rain. . . .

We also need an effective and reliable device that will detect mines and booby traps. These two types of devices are accounting for more Marine casualties in Vietnam today than all other casualty-producing agents combined. We have metallic detecting equipment but many of the mines and booby traps contain no metal.

What can we develop to help us detect booby traps in Viet Cong villages, caves and tunnels? As we open up more roads, railroads, villages, canals and rivers, the problem of mine and booby trap detection will become more and more of a concern to us.

Night vision is another area where we need imaginative help from industry. Lieutenant General Krulak, Commander of our Fleet Marine Force in the Pacific, said, "Give me a set of contact lenses that I can issue to every Marine so he can see in the dark as if it were daylight and we'll get this war over in a hurry." We're ready to accept something less than General Krulak's request but, whatever it is, it must be an improvement over the presently available equipment that is either too bulky or is tethered to a heavy power source.

. . . Industry made extraordinary efforts to get seismic intrusion devices and the moving target indicator to our forces in the field. The real meaning of their efforts is best stated by the failure of the Viet Cong to make a single successful incursion against the airfields at Da Nang and Chu Lai since they were installed.

Our operations in Vietnam have shown us that we need a good vehicle for use in marginal terrain. The vehicle we would like must be capable of operating over rice fields, dikes, mud, swamps and all varieties of terrain and, if at all possible, it should have the same degree of reliability that we get now from a two-and-a-half-ton truck on a good road. The vehicle that answers this need also may satisfy some of our requirements for ship-to-shore movement. In this connection, and looking not at Vietnam but at our pure amphibious requirements, the Marine Corps also needs industry's assistance to help us develop a high-speed amphibious support vehicle to move supplies and equipment from the dispersed ships of an amphibious task force to logistic support areas and using units ashore. The Landing Force Development Center at Quantico, Va., has been testing vehicles using the hydrofoil, planing hull, and hydrokeel or air cushion principles, but so far we've not been able to get a vehicle that has an acceptable high speed capability over both water and land.

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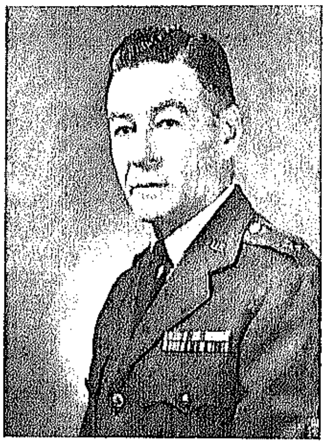
Address by Maj Gen. Glenn A. Kent, USAF, Asst. for Concept Formulation, Office of Dep. Chief of Staff (Research & Development), Hq., U. S. Air Force; and Dep. Chief of Staff, Plans, Hq., Air Force Systems Command, at Annual Meeting of the American Institute of Aeronautics & Astronautics, Boston, Mass., Nov. 29, 1966.



Brig. Gen. Glenn A. Kent, USAF

Technological Challenge of the 1970's in the Aerospace Field

Today, I would like to dwell on "how" we go about generating and producing the improved weapon systems that will enhance our operational capabilities in the 1970's. It is extremely important that we repeatedly and continuously appraise the organizational patterns and procedures which we use to deal with the challenges ahead. It is incumbent upon all of us—from Office of the Secretary of Defense (OSD) down—to constantly evaluate and re-evaluate not only the major decisions as to which systems are to be developed and procured, but also to evaluate the processes by which the decisions are made. Within the Services, the research and development communities must structure their administration, their thinking and their philosophy in such a way that no system concept of merit flounders for want of a road map through what appears to be an endless maze of bureaucracy.

During the past few years both the philosophy and methods of allocation of DOD resources have undergone significant changes. The decision makers who control the release of dollars for new systems and programs have evolved new procedures and new standards by which their determinations are made. This, of course, is not news to any of you.

In the early years of the new regime many of the military failed to comprehend the significance of the changes and rebelled at the centralization of authority which, along with an increased efficiency, the changes brought about. There is no doubt that fighting the problem, consciously or subconsciously, diverted a great deal of effort that should have gone into more constructive channels.

There are now fairly well described procedures that will be with us for the indefinite future whether we approve or disapprove. The Air Force (I can really only speak for the Air Force) is, for the most part, convinced of the effectiveness of these procedures. Certainly all are totally aware of their inevitability.

In response to the changing environment, the Air Force is realigning its planning process. It is our aim, once this realignment is implemented throughout all echelons of the Air Force research and development community, that there will be a much sharper focus on the basic philosophy of our research and development planning and on our procedures for marrying technology to operational problems to beget new and useful weapon systems on a timely basis.

In the past, much of the planning activity centered around the word "requirements." This word took on many meanings. A requirement sometimes expressed a deficiency or need; sometimes it described a proposal for new systems or equipment, namely, a Specific Operational Requirement (SOR). Frequently these SOR's attempted to specify—and those from higher headquarters even to direct—in minute detail the technical solution for the deficiency.

It is now generally accepted that directing the solution in the early stages is not appropriate action for either higher headquarters or the operational commands. It leads to all

the dangers inherent in the prejudgment of solutions. Through a process of evolution, the "proposal" is replacing the "requirement" as the focus of our planning activities. It may appear that we are only creating a semantic disturbance, but we feel strongly that much of the haziness that enshrouded previous considerations will be dispelled by terms that identify more explicity the particular planning activity in which we are engaged.

It is the responsibility of Air Force Systems Command (AFSC), with general guidance from Headquarters, USAF, and the operational commands, to formulate and to conceive proposals for weapon systems to alleviate operational deficiencies and improve our capabilities. It is the planners' job to amalgamate the system concept from a multitude of inputs. Now everyone has his own graphic portrayal of this so-called "planning process." My favorite pictorial representation involves a giant witch's cauldron into which are dumped indeterminate quantities of the "political" by a politician with a bowler hat; the "threat" by a sinister looking character with cloak and dagger; the "technology" by a man in a white smock; and the "needs" by an officer resplendent in crash helmet and flying suit. In controlled quantities each provides his own particular input to the cauldron. Also by the cauldron is a planner with a hugh paddle agitating the brew, which is labeled "Studies and Analyses." Out of all this, the ingredients and the stirring, congeal golden nuggets called "System Concepts." The system concepts form the basis for proposals for new systems for the operational inventory and these, of course, are what we are after. Enough of my mirage of the world of planning.

Next, I would like to expound on a matter that centers on the word "plan". Many people state we would do much better if we just had a plan. My reply is that we do have one, it is called the Five Year Defense Program (FYDP) (formerly the Five Year Force Structure and Financial Program). The disbelievers invariably will scoff that the FYDP does not tell what the Air Force is to do even in the five years which it covers. Much less for the years succeeding! It cannot be regarded as a plan—certainly not a good one.

But I contend that the FYDP is a plan in the classical sense of the word. It tells, among other things, how those in charge of research and development are to allocate their resources to do battle in the technological race. The resources are manpower and dollars. Then there is the charge that the program is not a "long-range plan." It extends only for the next five years. True, it is very explicit in describing what resources are available to the Air Force for research and development for those five years. This, in turn, affects the posture of the Air Force for the next 20 years. So it is a long-range plan in terms of its lasting impact. The next rejoinder—that it is not a good plan—is a different subject.

If it is not, perhaps, a good plan, we arrive at my central theme; we are one step closer to the central issue. If you don't like it, change it. That is what planners are for, and changes are made by proposals to those that have the authority to make changes.

Then the heart of the matter is how to go about getting proposals approved. To repeat, changes in the plan can be accomplished only by initiating proposals and by obtaining OSD approval of them. I know of no other way.

Now the question is: By what process do we generate proposals that will change the plan? We think of this as a process having four separate categories of activities. The word "categories" to delineate development planning activities should not be confused with the six categories of Defense Research, Development, Test and Evaluation (RDT&E), that is, research, exploratory development, advanced development, etc. The categories for planning activities are these.

- Category A—Proposals for systems for the operational inventory. This activity involves a concept formulation package (CFP) to attain approval for contract definition.
- Category B—Proposals for advanced development programs.
- Category C—Mission analyses.
- Category D—Technology application studies.

I will describe each of these in turn.

Category A activities set up a stream of milestones having to do with developing and acquiring equipment for the operational forces. The last of these milestones is: "There is now an operational capability." The CFP is the means by which we hope to influence the high-level decision makers to grant approval for new starters, that is, to change the program. The primary objective is to convince the particular authority who controls resources that the system, equipment, or facility described in the proposal is the best means of alleviating an identified deficiency and that the increased capability afforded by this system is such that resources should be expended toward development. The CFP must contain the following essential elements:

- A description of the proposed system or facility.
- Its costs and schedules.
- The rationale as to why a particular design was selected and why it offers enough utility (increased operational capability) to justify that money should be reserved for development. This final argument also must include reasons for initiating development "now," generally the next fiscal year.

As stated earlier, concept formulation begins with the recognition of an operational deficiency. This deficiency may be expressed by an operational commander in a statement of a Required Operational Capability (ROC), as defined in Air Force Regulation 57–1, or orally, or by letter from a key person in USAF or OSD. The ROC need not be anything more elaborate than a statement by a key operational commander that, for example, our capability for night attack is quite deficient. In fact, a statement like this from a four-star general, with appropriate embellishments, is truly a ROC as distinct from a pebble.

Generally, the first step in preparing a CFP is to conduct Preliminary Design Studies. These further configure the system concept and describe that which is technically feasible. The Requests for Proposal should specify desired performance parameters, but never specify the design. Generally, the design will be based on technologies we have reasonable confidence in achieving. Further, the associated costs and schedules will be shown in considerable detail.

The Preliminary Design Studies that lead to a description of the system are generally contracted out to

industry. The assessment of the utility of the proposals and the preparation of the overall CFP is an inside job, that is, the assessment of utility must be done by the Air Force. The selection of which particular design, among many, will be proposed is the responsibility of Headquarters, USAF, the operational command, AFSC and, finally, even higher levels of authority.

The rationale in the CFP must provide the basis for the Chief of Staff and the Secretary of the Air Force, or someone on their staffs, to persuade the Secretary of Defense, or someone on his staff, to approve the system and reserve money. The rationale should always be based on objective analysis. This does not mean that the planner cannot be a persuasive advocate. On the contrary, objective analysis is an integral part of advocacy. Being a seller and being honest are not exclusive options. Furthermore, persuasive advocacy must adhere to a policy of open disclosure in which all the evidence pertaining to the case is presented.

Based on the information contained in a CFP, money may be reserved in the budget for a new system or subsystem, but this does not necessarily constitute final program approval and release. Final program approval is obtained upon approval of the Preliminary Technical Development Plan (PTDP). The latter is a product of AFSC headquarters and AFSC divisions with inputs from the operational commands and industry. Final approval of the PTDP obtains release of the funds for engineering development, the first phase of which is normally contract definition. So Category A has to do with items for the operational forces.

The second category of the planning process—Category B—has to do with proposals for advanced development programs. Advanced development programs are designed to demonstrate technical feasibility and to establish the confidence level in an experimental system or equipment which eventually may be incorporated into some system for the operational inventory. Such a proposal should contain:

- Description of the proposed demonstration and technical approach.
- Costs and schedules.

tionale which includes the po-
payoff if the equipment works;
te particular technical ap-
'as selected; and why it
should be done now and not at some later date.

(You will note the proposal for advanced developments bears a strong resemblance to proposals for Category A systems—operational systems.) Advanced development programs end when they succeed! This is sometimes lost sight of and people are loathe to stop their program when their success rate is high. But exploitation of the technology is taken care of by Category A type activities.

The third category—Category C—has to do with mission analyses. Here we examine in depth some particular operational mission or function such as night attack, or strategic reconnaissance, or surveillance. The objective is to identify new promising system concepts or equipment that will improve our operational capability in the mission area being studied. Mission analyses provide one of the forcing functions for directives to initiate a Category A activity—develop a proposal for an operational system—or a Category B activity—develop a proposal for an advanced development program—or for both, concurrently. They may also provide a focus for new technology efforts (exploratory developments). Mission analyses can be conducted by personnel from Headquarters, USAF, the operational command, Headquarters, AFSC, an AFSC division, or a task force composed of representatives of any or all of them, including personnel from industry. The responsibility for initiating and organizing task force efforts rests with Headquarters, USAF, or with Headquarters, AFSC.

Category D activities are called technology application studies. In such studies, a specific technological advancement, such as the laser, is examined to determine possible useful applications to various operational missions or functions. In Category C one knew the problem and was looking for a solution. In this category, Category D, one has the solution and is looking for the problem. Technology application studies also provide a basis for directives to initiate a Category A activity or a Category B activity, or both. In addition, Category D studies may provide a basis for re-orienting existing major programs. Primarily, this activity is conducted by AFSC divisions, centers, laboratories, or task forces.

In both Category C and D activities, technical personnel are heavily involved. They bring to these groups an understanding of what is possible. The planner marries them to operational people who have an understanding of what is useful. The offspring is, hopefully, new system concepts. Thus Category C and D activities provide forcing functions for the generation of new proposals; Category B activities provide the technical base for Category A activities. Category A activities provide the basis for getting things into the operational inventory and, after all, this is the final payoff.

The key question in each category is: "What end result is expected of this activity?" If the desired result is to provide a basis for decision to proceed with contract definition and subsequent full-scale development and deployment, a CFP must be drafted and assembled. If demonstration of feasibility is the problem, the project is an advanced development and the demonstration must be described. From a mission analysis or technology application study we expect to identify new system concepts that are worthy candidates for a Category A activity generating a firm proposal for an operational system.

A new project must be constructed with one eye always upon the objective of its incorporation in the FYDP. The decision maker, who gives the go-ahead on new starters and controls the allocation of resources, is at a high level in the DOD hierarchy. All planning activities should be geared to convince him that he should first reserve resources (and eventually release these resources) to accomplish the program that is proposed. The only recognizable measure of success for the planner is the approval of a "new starter," one that will provide effective equipment to the operational forces on a timely basis.

Obviously there are other ways to view the planning process. But the adoption of a common terminology which avoids imprecise and ambiguous terms is essential. Asking, "What is expected?" and then carefully identifying the effort as being in one of the four categories will leave no doubt as to what is intended. As a much-needed management tool, we do exactly this by always asking, "What Category?"—"What do you expect?"

But to remind you, our greatest challenge is to harness the technology we already have or which is in the offing. There are many opportunities for improvements—improvements with large systems or with small subsystems. To recite a few:

- We would like to have the capability of preventing enemy re-entry vehicles with nuclear warheads from impacting on the United States.
- We would like to be able, in turn, to have high assurance of penetrating enemy defenses with our re-entry vehicles and aircraft.
- We need the capability to detect enemy personnel, trucks and equipment wherever they might be even when hidden beneath jungle canopies or in caves.
- We would like the best fighter in the world for air-to-air ground missions, to improve the circular error probability (CEP) of the weapons delivered and be able to deliver these weapons in darkness or adverse weather.
- We would like the ability to prevent ambush by having the capability of detecting the presence of other humans that might be nearby.
- We would like to know the whereabouts of all friendly and enemy forces on a continuing basis, and in real time, and the capability to distinguish accurately between them and to communicate quickly and without error to the friendly ones.
- We would like to reduce the vulnerability of aircraft (and missiles) prior to launch from attack by enemy forces.
- We would like to be able to stop the movement of enemy troops and supplies while at the same time have our own lines of communications secure.

In short, we would like to be able to search out and destroy the enemy in all circumstances and environments without undue loss to our forces. The appetite of the military is insatiable. We are really never satisfied with the state of the art nor should we be. We have a universal requirement for systems that cost nothing, are completely reliable, have infinite range and speed, are invisible, have a zero CEP, and can be operated efficiently by Air Force personnel.

The enumeration of ROC's, as I have just done, is without meaning or impact unless we find out what technology can provide and generate new system concepts, and obtain approval and funding. The Air Force can operate only that which OSD funds and the engineers build. The challenge is to be absolutely sure that we develop and procure the best systems that technology can provide at that time. By exploiting technology you do not use it up. It is like knowledge. The more you exercise it the more you have. It is a self-feeding process. One forcing function for better technology tomorrow is to put to use the technology we have today. This requires a thorough mixture of many ingredients in the witch's cauldron that beget proposals that change the plan that begets systems that improve our posture. This is a stern challenge but the rewards are large.

Address by Capt. Joseph L. Howard, SC, USN, (RAdm. selectee) Dep. Chief of Naval Material (Procurement), at the 10th Annual Seapower Symposium, Navy League of the United States, Washington, D. C., Feb. 8-10, 1967.

Capt. J. L. Howard, SC, USN

Current Points of Emphasis in Navy Contracting

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The Navy today is depending more and more on industry for an ever-widening range of its needs, for the development of new ideas, for the production of its weapons and equipment, and for services in support of existing weapon systems.

Therefore, the contract itself, as a working document, is becoming more important than ever before. Indeed, it is becoming one of the Navy's prime instruments of administration, in research, development and production programs.

Because of this, we are giving our contracts more attention than ever before.

We recognize the importance of making awards smartly and properly in the first place. But we also realize that the contract instrument must establish a working relationship that remains sound throughout the life of the contract.

In serving these purposes, we are giving special emphasis to certain points in our contracting programs. It is important that we all have a good understanding of the implications of the contractual instrument, and what it involves in terms of commitments by both parties.

It is in this light that I would like to touch on some points of current Navy emphasis in contracting.

Risk. First, on the question of risk. It is general Defense Department policy, in contracting, to shift risks more and more to the individual contractors, and then reward them accordingly for successful accomplishment of all contract commitments.

The financial risk for the contractor, of course, is what normally comes to mind when we think of risk.

However, of major importance to the Navy is the technical risk involved in achieving the quality, performance and reliability standards called for in the contract.

We in the Navy are now looking for better balance between financial and technical risks in our contracts today. We will be making more astute assessments of such risks in the future.

We do not want our contractors to shave on performance in order to save on dollars. This means that potential contractors themselves must make more astute and competent assessments of all risks.

When a company contemplates going into a Navy contract, it should look carefully at the technical risks, and then price out the situation accordingly. Naturally, we want the best possible prices, and this is why we encourage competition. But whether competitive or not, the technical risks involved are going to come in for more harsh scrutiny than ever before.

When you look over our programs, ask yourself whether the Navy's requirement calls for a scientific breakthrough, or a technological quantum jump, or some revolutionary produc-

tion technique, or some wholly new approach to test and evaluation.

On our side of the table, we are going to sharpen our own awareness of the technical risks involved, and this will have a bearing on source selection, and the selection of contract type.

This brings me to my next point.

Responsibility Determinations. We are placing heavier emphasis on proper determination of company responsibility.

Again, as in risk, when we think of responsibility determinations, certain standard, routine ideas come to mind. When we say we will not deal with marginal suppliers, the standard thought is that we are talking about neighborhood bicycle shops or shoestring ventures.

Actually, the question of responsibility can be raised in connection with some of the giants of industry, some of the best known companies in the country.

The Armed Services Procurement Regulation requires that the contracting officer make a positive and affirmative determination that a company is responsible before an award can be made.

In addition to financial resources, the contracting officer must consider the company's current plant load, its ability to take on more work, and its past record of performance and integrity on other Government contracts.

Also, we must consider the company's organization, experience, operational controls, and technical skills to do an effective job in a complex weapon system program.

In this connection, we are giving hard looks at company management, laboratory resources, engineering staff, production and test facilities, and whether it has voids and gaps in certain disciplines that are essential to the program under consideration.

We will be using the Contractor Performance Evaluation reports more fully now, since this program is constantly developing more and better information for us.

There is one further policy point that is pertinent here. The burden of proof for establishing the responsibility of a prospective contractor lies ultimately with the prospective contractor himself, not the contracting officer.

If a contracting officer is convinced that a particular company does not have the organization, the staff, or the know-how to meet complex commitments under contract, and if the company disagrees, it is up to the company to show that it has the necessary capabilities or can obtain them readily.

Contract Type Selection. A third area of emphasis in our contracting programs is in the selection of the proper type of contract for the situation involved.

We have been shifting rapidly in the last two or three years from cost-plus-fixed-fee (CPFF) contracting, and we now believe that 10 percent of our procurement dollars in CPFF contracts is about right.

We are now reviewing our experience under various types of contracts. We are taking a critical look at progress under these contracts and evaluating the results to date.

We are trying to determine the relationship of contract type to the quality of contractor performance.

We believe, for example, that some of our cost-type contracts might better have been fixed-price type. On the other hand, we have some fixed-price types that might better have been of the cost-type.

We will not be making any dramatic changes, either in policy or approach, as a result of these reviews. But we do regard the type of contract a matter to be determined finally during negotiations.

Those of you who have done business with the Navy in the past know that normally we have an idea of the type of contract we think is appropriate. The Request for Quotations will often state what kind of contract we expect to end up with. However, this is not firm. We recognize that information may come up during negotiations to indicate that a different type of contract is best suited to the procurement at hand.

In short, we are going to be more discriminating in our choice of contract type in the future, and we consider it a matter for negotiation.

Developer/First Producer. Another area in which we are giving emphasis in the Navy is in the developer/first producer policy.

The Armed Services Procurement Regulation allows us to direct the first production of a product to the original developer. We in the Navy are pushing this approach.

We are convinced that competition is the spark of progress in our country, and we hold to this policy above all others.

However, we also recognize that in some of our major programs, we can do ourselves a disservice if we go into competition prematurely.

Some of our problems of the past have come from the fact that we have tried to get competition by the use of data packages which reflected only a developmental effort. We have found that without on-going production experience, a data package simply may not be an adequate basis for competitive production contracts.

This is not always true, of course. But it is true often enough to make it necessary for us to look very closely at each situation and decide when is the appropriate time to get competition into the picture on a new system.

If we can get competition at an early design stage, fine. On the other hand, if a system is designed and developed by a single company, chances are that company will also get the first production contract under current Navy policy.

We believe that our emphasis on the developer/first-producer policy will result in our getting more realistic data packages, packages that give us a sounder basis for competition for second and on-going production programs.

Quality Control. Another area we are stressing is quality control. This relates to the selection of contractors in the first place, and it is a matter for closer scrutiny during the administration of our contracts.

Here is an area where industry can make perhaps the greatest possible contribution.

We are not talking here about quality in the sense of gold plating, using platinum where tin will do. We are talking about the thousands of simple, routine tasks that go into putting a complex weapon system together, and making sure it works.

In the final analysis, quality work comes from within the individual man, the individual engineer, technician and workman on the bench. It comes from a man's pride in what he is doing, his attention to the details of his job, his inner desire to turn out a piece of work that is flawless.

We have had too many cases of aborted tests, and aborted operational runs, where the system failed simply because someone didn't tighten

a screw properly, or a circuit weld was poorly done, or a plate was put in backwards, or left out entirely.

Quality control is one of our most critical concerns these days. We are going to examine a company's past performance in this area more closely before we make a final award in the future. And, after awards are made, we are going to be hammering hard on the maintenance of a strong, thorough company quality control system.

Design Simplification. Another area that is receiving increasing attention is in the simplification of equipment designs.

It is bad enough when a piece of equipment breaks down for poor quality work. But when this happens and then the equipment is too complicated to fix on the spot, this is wholly unacceptable.

A lot of good has been done along these lines in the past couple of years, but there is yet much to be done.

In the Navy we are putting more stress on the use of incentives in our contracts to encourage design simplification without degrading product performance and quality. We are trying to develop ways to say, in effect, the simpler your design for maintainability and parts support purposes, the more profit you will make.

These elements are not easy to quantify, we realize. But we have been working closely with industry through various joint efforts, conferences, working committees and task groups, and I mention it here to reaffirm the emphasis we are placing on this subject.

Standardization. Standardization is another area in which we are placing heavy stress, particularly in our shipbuilding programs.

The range and variety of equipments, components and parts we use in the Navy have become a matter of real concern in terms of material management, maintenance and support. Not only is it a matter of economic concern, but also it is of operational significance.

We are, therefore, structuring our contracts these days with incentives to those companies who are able to offer us equipments for which we already have parts in stock.

We are, of course, balancing this against the need for continuing technological progress. We certainly do not want to standardize on things that are obsolescent when something better is available. But where designs, configurations and performance are not subject to quantum-jump improvements, we are looking for greater standardization, both for economic and operational reasons.

Life Cycle Costing. Another point of emphasis in Navy procurement programs is in the area of life cycle costing.

Without dwelling on details here, this is a technique by which we quantify certain elements of the cost of ownership of a piece of equipment. Rather than make an award solely on the basis of initial cost to us, we are developing factors by which we can evaluate the cost of owning the item throughout its life cycle.

For example, we have developed some dollar value factors to measure mean time between failure, to measure the cost of spare parts support throughout the life of certain equipments, to measure the cost of operating the equipment, fuel costs, for example.

We have used this technique in buying diesel engines, batteries, electronic resistors, generators and similar items.

We expect to apply these techniques during the coming year to sonar equipment, gyro indicator systems for aircraft, air coolers, electronic test equipments and others.

There are two points of significance to be emphasized here.

First, we have started on relatively simple items in order to establish a sound conceptual base for this technique. We are now moving progressively into more complex items.

Second, although it appears that these factors are applied only to relatively minor component items, as distinguished from the big complex weapon systems, we are, in fact, applying these techniques in the assessment of awards on some of the big systems as well.

In the FDL total package program, for example, life cycle cost factors in connection with shipboard equipments and components are being applied as part of the evaluation process.

Here again, we solicit industry suggestions and ideas on what elements of life costs we should consider, and how these can be quantified for evaluation purposes.

These are three other aspects of our procurement programs that the Navy is stressing, and I would like to touch on these only briefly.

Advance procurement planning is becoming a way of life for us now. We are injecting procurement and logistics considerations into the earliest possible planning and program decision processes.

Administrative procurement leadtime is another matter that is receiving concentrated attention in the Navy today. We believe that advance procurement planning will help in this regard, but we are also taking actions to sharply reduce the time it takes to make a contract, once the program is funded and approved.

Personnel training is the third area to be mentioned only briefly. We recognize that there are some gaps between our policy pronouncements and what comes out in actual practice across the negotiating table.

We will be concentrating this year on more astute application of weighted guidelines, more discriminative use of the incentive provisions, more care in dealing with the question of data rights.

Generally, we look to 1967 as a year for consolidating many gains made over the past four years in new, sophisticated procurement techniques.

We believe we have the tools in procurement now that can help us make better contracts than ever before. Our job this year will be to refine our skill in using these tools.

We want our contracts to be good ones. We believe that a good contract is one that satisfies both parties. It gives the buyer exactly what he asked for, when he wanted it, at a price he considered reasonable, and was willing and able to pay.

At the same time, a good contract should give the seller the satisfaction of producing something useful, with the requisite quality, for a reasonable profit, plus the creation of a satisfied, steady customer.

The ultimate object, of course, is to keep the Navy strong, trim and combat-ready, to insure that the United States remains a powerful force for freedom throughout the world.

The industry-Navy team makes a monumental contribution to the achievement of that object. The binding element for that winning team is the contract. For this reason both the Navy and industry must continue to work hard to make our contracts good, sound, working documents that assure the delivery of superior weapon systems, on time, and at prices the national economy can afford to pay.

Calendar of Events

May 2–3: National Security Industrial Assn. Seventh Innerspace Conference, Washington, D.C.
May 3–5: Electronic Components Conference, Washington, D.C.
May 7–12: Electrochemical Society Meeting, Dallas, Tex.
May 7–12: American Society of Civil Engineers Meeting, Seattle, Wash.
May 8–10: Fludics Symposium, Lafayette, Ind.
May 8–13: Mechanical Contractors Assn. of America Meeting, Kansas City, Mo.
May 10–12: American Helicopter Society Meeting, Washington, D.C.
May 11: American Ordnance Assn. Meeting, Washington, D.C.
May 11: National Defense Transportation Assn. Meeting, Fort Eustis, Va.
May 15–18: Society of Plastic Engineers Meeting, Detroit, Mich.
May 16–18: National Telemetering Conference, San Francisco, Calif.
May 20: Armed Forces Day.
May 22–25: American Insitute of Aeronautics and Astronautics Advanced Marine Vehicles Meeting, Norfolk, Va.
May 26–28: Empire State Labor Management Exhibition, Roosevelt Raceway, Long Island, N.Y.
June 6–8: Armed Forces Communications-Electronics Assn. Meeting, Washington, D.C.
June 8–11: American Battleship Assn. Forth Annual Reunion, Las Vegas, Nev.
June 11–15: American Nuclear Society Meeting, San Diego, Calif.
June 12–14: American Institute of Aeronautics and Astronautics Commercial Aircraft Design and Operation Meeting, Los Angeles, Calif.
June 19–21: Heat Transfer and Fluid Mechanics Institute, La Jolla, Calif.
June 20–23: Data Processing Management Assn. Meeting, Boston, Mass.
June 20–26: Society of Nuclear Medicine Meeting, Seattle, Wash.
June 25–30: American Society for Testing Materials Meeting, Boston, Mass.
June 28–30: Joint Automatic Control Conference, Philadelphia, Pa.

Military Prime Contract Awards by Commodity Category

[Editor's note: Below is a table of military prime contract awards for the first eight months of FY 1967. The contract information in the summary is broken down by major commodities for the current fiscal year and includes, for comparative purposes, corresponding information for the same period in the last fiscal year.

These summaries have heretofore not been released in this form. In the future DOD plans to periodically release similar procurement summaries and they will be published in the Defense Industry Bulletin *when available.]*

(Amounts in Millions)

	July 1966 Feb. 1967	July 1965 Feb. 1966	Net Change
Aircraft	$6,530	$4,377	$2,153
Missile and Space Systems	2,916	3,025	−109
Ships	1,622	706	916
Tank-Automotive	681	817	−136
Weapons	325	219	106
Ammunition	1,868	1,460	408
Electronics and Communications Equipment	2,223	1,905	318
Other Hard Goods	1,581	1,184	397
Hard Goods (Sub-Total)	17,746	13,693	4,053
Subsistence	742	676	66
Textiles and Clothing	836	585	251
Fuels and Lubricants	933	726	207
Soft Goods (Sub-Total)	2,511	1,987	524
Construction	512	569	− 57
Services	2,544	1,790	754
All Actions under $10,000 each	2,561	2,195	366
Total [1]	$25,874	$20,234	$ 5,640

[1] Excludes work done outside United States and also excludes civil functions (rivers and harbors work) of the Army Corps of Engineers.

Procurement during February, 1957, totalled $3.2 billion compared to $2.4 billion for February 1966. Large individual contracts placed during the month of February 1967 include: Avondale Shipyards of Louisiana, $109 million for destroyer escorts; National Steel and Shipbuilding of California, $161 million for landing ship tanks (LST's); Philco Corp. of California, $59 million for Shillelagh missiles; A R O, Inc., of Tennessee, $103 million for maintenance and operation of the Arnold Engineering Development Center; and General Dynamics of Texas, $195 million for aircraft.

U.S.-Canadian Logistics Cooperation

by

Lansing R. Felker
Office of International Logistics Negotiations
Office of Asst. Secretary of Defense (ISA)

Historically, the United States and Canada have enjoyed a gratifying and remarkable degree of cooperation in defense logistics—a cooperation both pervasive and varied. For example, the United States provides engines and other equipments equivalent to 40 percent of the value of the Canadian CV-7A Buffalo aircraft. The XM-571 tracked vehicle, which is a joint U.S.-Canadian development, incorporates a U.S. engine, transmission and other components. Canada provides subcontractor assistance to U.S. firms for the C-5A transport aircraft and the F-111 tactical fighter.

U.S. manufacturers have licensed Canadian companies to produce U.S. equipment. Canada produced 240 CF-104's for its own use and 140 F-104's for a joint U.S./Canada Military Assistance Program, under license from Lockheed. Canada produced the Mark 44 torpedo under a General Electric license and is currently starting a $200 million CF-5 program of production in Canada, under license from Northrop, a program which will involve a U.S. input of more than 30 percent on a program basis. Canada has also been a good customer of the United States in terms of direct purchases. These have included the M-109 155mm self-propelled howitzer, CHSS-2 ASW helicopters (assembled in Canada), about 1,200 M-113 armored personnel carriers and 24 C-130 transport aircraft. In addition, many U.S. companies have subsidiaries in Canada. Examples are Canadair, owned by General Dynamics; United Aircraft of Canada, Ltd., which handles all of United Aircraft's piston engine work world-wide; RCA which accomplishes plasma physics for DOD and NASA; and Litton (Canada), Ltd., which provides inertial platforms for U.S. aircraft guidance systems.

This unique defense logistics cooperation between Canada and the United States is currently formalized in the Production Sharing Agreement. This most recent formalization of the continuing relationship, founded in World War II and first expressed in the Hyde Park Agreement of April 1941, is based on the recognition of:

- The naturally close economic relationship between the two countries.
- The mutual interests in North American continental defense.
- The complementary relationships of the two defense industries.
- The necessity for some planning so that this relationship realizes maximum benefits for both countries.

The goal of this cooperation is to gain maximum advantage from both defense industries by overcoming, through management, the natural inequalities between the United States and Canada resulting from disparity in size of the two defense industries and the two defense establishments. This has been accomplished through:

- Coordination of U.S. and Canadian military requirements and production.
- Removal of obstacles to reciprocal procurement and flow of defense goods between the two countries.
- Developing channels for the regular exchange of defense planning and technical information between the United States and Canada.

This cooperation had its first major implementation during the total defense mobilization of World War II when production planning first became necessary. Then, in February 1952 as the result of the demands of the Korean War, an agreement was entered into between the Canadian Department of Defence Production and the U.S. Military Departments authorizing the Military Departments to place contracts with Canadian firms through the Canadian Commercial Corporation (a Canadian government agency), and prescribing provisions relating to foreign exchange, inspection, profit limitation, surcharges, administrative costs, use of Government-owned tooling and facilities, reciprocal audit arrangements, and other administrative matters.

In Canada, the Department of Defence Production was established in 1951 to centralize the procurement of goods and services on behalf of the Canadian defense forces and, as an adjunct to this principal role, to help restore and maintain an effective defense industrial base. By selective procurement policies, Canadian firms directly involved in the manufacture of defense equipment and the aircraft industry, in particular, were raised to a viable level. Capability was developed for production of selected aircraft, aircraft engines, a number of radars, sonar and sonobuoy equipments and many types of communication equipment, and orders for these items were obtained from the U.S. Military Departments. In short, while Canada continued to look to the United States for a substantial part of its military requirements, it had during the period from 1951–58 organized its defense industry so as to be capable, on a selective basis, of meeting U.S. requirements and competing with U.S. and other defense markets.

It is clear that not only the concept of production sharing, but also the necessary industrial base and a complex of working arrangements and procedures had been established before 1958 for the purpose of promoting cross-border military procurement. In 1958 the Canadian government had a new interest in stepping up production sharing to levels comparable with those attained previously during World War II and the Korean hostilities. This interest resulted from the decision of the Canadian government in September 1958 to curtail the CF-105 supersonic interceptor aircraft program and to introduce the U.S.-designed and produced Bomarc missile and SAGE control equipment into the Canadian air defense system.

In view of its limited financial resources and the complex technology of advanced weapon systems, Canada did not have the capability and could no longer afford the costs and risks inherent in independently undertaking other development and production programs of such magnitude. Instead, Canada decided to rely on the use of U.S.-developed major weapon systems. At the same time, both the United States and Canada recognized that the decisions required of the Canadians were economically and politically impracticable unless reasonable opportunity was provided Canadian defense industry to participate in the production of components and equipment required not only for the then newly

integrated air defense weapon systems but also for other weapon systems developed in the United States for the common defense.

Based on the logic of the 1958 agreement, the Production Sharing Agreement has developed into a smooth working machinery of cross-border procurement which has averaged over $150 million per year each way during the period 1959 through 1966. The United States has placed the majority of its business in Canada directly through prime contracts, both government-to-government and government-to-industry, although subcontracting from U.S. industry to Canadian industry has tended to increase steadily. On the other hand Canada has placed the great majority of its orders in the United States through subcontracts on the industry-to-industry level. This high Canadian subcontract level results partly from the Canadian interest in keeping industrial management talent and from the number of Canadian purchases that are channeled through Canadian subsidiaries of U.S. firms.

Through 1966 the procedures of the Production Sharing Agreement have been aimed primarily at providing Canadian manufacturers with competitive access to the U.S. defense market, so that Canada could balance its defense expenditures in the United States. Canada has successfully maintained selective competitiveness in certain areas of defense production, while giving up its capability entirely in others. To date Canada has achieved this goal to the extent that the cumulative cross-border defense balance between the two countries since 1959 is about $200 million in Canada's favor, i.e., the United States has spent almost $200 million more in Canada than Canada has in the United States. This fact is not surprising in view of the disparity in the U.S. and Canadian defense markets ($50 billion-plus U.S. defense budget compared to a Canadian defense budget of less than $2 billion), the relatively greater integration of the Canadian government/industry machinery (The Canadian Department of Defence Production and the Department of Industry are headed by the same Minister), and the strong emphasis placed on the program by the Canadian government. Joint research and development programs are also important to the success of the program and a number of such programs are in being. The Canadian government also funds, on its own, research and development programs with the end objective of meeting U.S. military requirements of the future.

The Production Sharing Agreement has successfully introduced Canadian manufacturers to the U.S. defense market and the machinery of that agreement is being constantly adjusted so that a relative balance of cross-border procurement will be achieved at the highest practicable economic level. Current discussions are producing a greater access by U.S. manufacturers to the Canadian market and projections of cross-border spending show an estimated increase in annual spending of 50-75 percent over past averages. Future spending by Canada in the United States should include equipment for the Canadian Mobile Force, especially transport aircraft, helicopters and ground vehicles. In short, the Production Sharing Agreement between the United States and Canada has proved the workability of close cooperation between defense establishments and defense industries, even between countries of large disparity in population size, where there is a commonality of purpose in mutual defense.

DEFENSE PRIME CONTRACT AWARDS TO SMALL BUSINESS

(Amounts in Thousands)

	July 1966 Jan. 1967	July 1965 Jan. 1966
Procurement from All Firms	$22,338,108	$17,746,810
Procurement from Small Business Firms	4,579,409	3,750,409
Percent Small Business	20.5	21.1

Research in the Air Force

(*Continued from Page 18*)

ranging. These are just a few across-the-board examples. Space does not permit me to elaborate further.

A question often asked is, "How is fundamental research managed in a military command?" It's a good question—the answer is really simple.

First, we stress quality research, not quantity research. Our guiding policy is what we do, we do well. To obtain this quality research we apply five management concepts. They are:

- Centralized command at OAR headquarters.
- Centralized planning and definition of research objectives—with inputs from the field elements.
- Creative environment for our researchers.
- Stabilized support for scientific investigations.
- Decentralized program management.

As the commander of OAR, I am responsible for exercising executive line management over all elements and I am, of course, responsible for the effectiveness of research and for the use of the resources of the command.

At OAR headquarters we do the long-range planning, try to protect the field elements from the multitude of requirements which are so often handed down to lower echelons these days, and we make an honest effort to provide the tools OAR scientists need to do the job.

OAR field commanders are expected to devise and operate their own technical programs. It is their responsibility to provide an environment in which quality research can flourish and allow scientists freedom to conduct research without unnecessary hampering.

I believe that in OAR we have achieved an unusual balance between central policy control and decentralized program management. We are very proud of this research management policy which we believe is unique in a military organization and has resulted in many outstanding accomplishments.

Basic research provides new scientific knowledge on which applied researchers draw to give society a rich rate of interest. No investment has ever paid off so well as the investment in basic research.

We welcome research proposals from any competent source.

Oceanography in the Navy Today and Tomorrow

by

RAdm. John K. Leydon, USN

The oceanographic program of the Office of Naval Research (ONR) has traditonally been the main source of support for oceanography and related technology in the academic and institutional community. This ONR role essentially grew from the Navy's close working relationship developed with the major oceanographic institutions in World War II. In the decade immediately after the war, in particular, the Navy was essentially the sole Federal support for these oceanographic institutions. Even though other agencies, such as the National Science Foundation (NSF), have since undertaken to support work in the leading institutions and universities, the Navy still remains the backbone supporter.

With the strong scientific capability in oceanography being concentrated at institutions and universities, the ONR contract research program has been developed to allow utilization of this competence within the Navy. ONR has developed a strong external research program and the commands of the Chief of Naval Material have undertaken to develop an in-house laboratory capability to meet individual Navy laboratory needs.

In assuming this role for the external research program of the Navy, the ONR oceanography program has had a tremendous impact on the national oceanographic effort, particularly in the past decade. The upsurge in oceanography in the United States began in the late 1950's. One contributing factor in this upsurge was the U.S. participation in the International Geophysical Year (1957–58) of which the oceanographic program was a significant part. This program marks the awakening of interest in oceanography; however, subsequent actions have had a greater impact.

Within the Navy, ONR initiated the first long-range planning document for oceanography, known as TENOC, which was endorsed by the Chief of Naval Operations on Jan. 1, 1959. As a result, it became Navy policy to promote and support oceanography more vigorously. Almost concurrently with the internal TENOC document, the National Academy of Sciences' Committee on Oceanography published its far-reaching report, "Oceanography 1960 to 1970," in February 1959. This committee was organized at the instigation of the Chief of Naval Research. The Navy, in implementing TENOC, was also fulfilling most of the recommendations of the National Academy of Sciences' Committee on Oceanography. With Dr. James Wakelin, the Assistant Secretary of the Navy for Research and Development, serving as Chairman of the Interagency Committee on Oceanography, the Navy assumed the Federal leadership in the resulting period of national expansion in oceanography.

Within the Navy and the national program, ONR assumed major Federal responsibility for developing the academic and institutional capability in oceanography. Research programs by new groups were initiated, graduate student training was encouraged to meet critical manpower shortages, new facilities were provided, and new avenues for research and methods of attack were encouraged. Specifically, ONR has been largely responsible for the establishment of the oceanographic programs at John Hopkins University, Texas A&M University, Oregon State University and Massachusetts Institute of Technology, as well as for the expanded efforts at the University of Rhode Island and the University of Miami.

In addition to establishing new programs, ONR also assisted appreciably in building up the capabilities of the Scripps Institution of Oceanography, Woods' Hole Oceanographic Institution, Lamont Geological Observatory, New York University and the University of Washington.

RAdm. John K. Leydon, USN, is Chief of Naval Research, Department of the Navy. Some of his prior assignments have been Dep. Chief of Naval Material (Management & Organization; Dep. Comptroller, Navy Department; and Commander, Naval Air Turbine Test Station, Trenton, N. J. Adm. Leydon is a graduate of U. S. Naval Academy, and holds a degree of Master of Science in Aeronautical Engineering from the California Institute of Technology.

Besides providing the financial support for research and essential operating costs, ONR has enhanced these laboratories by providing some nine ships through new construction or conversion. At present, a fleet of some 28 ships, operated by private laboratories and jointly funded by Federal agencies, receives nearly 50 percent of its support from ONR, the largest portion of which comes from the Ocean Science and Technology Group of ONR. Many specialized facilities such as deep sea research vehicles, four-engined research aircraft, telemetering buoys and stationary towers also have been developed by or made available to these research groups through ONR. Even though the original TENOC and all subsequent revisions have called for the construction of facilities at the private institutions, the program in general has been unable to meet this commitment over the years. However, buildings have been constructed at Johns Hopkins University's Chesapeake Bay Institute and Columbia University's Lamont Geological Observatory with ensured support from ONR; other limited funding has been provided for pier facilities at both Scripps and Woods Hole Oceanographic Institutions.

While the ONR program has been mostly oriented towards the development of U.S. groups, its contributions to the field of oceanography have not been limited to domestic programs and capabilities. In a science which promotes a great deal of cooperation among nations, ONR has played a significant role in developing international programs and groups with the belief that their improvement will contribute knowledge of the oceans of value to the Navy. For example, the highly productive geophysics group under the direction of the late Dr. Hill in the United Kingdom received its impetus and sole support during its developing years from this program. In addition, lesser developed nations, in Latin America particularly, have received support. Most of the latter has been through cooperative programs with the U.S. groups sponsored by the ONR program and through international programs such as the IGY (International Geophysical Year), ICITA (International Cooperative Investigations of the Tropical Atlantic) and IIOE (International Indian Ocean Expedition).

The most readily identifiable accomplishments of the program are tangible items such as facilities, ships and manpower as this has been a period marked with program growth. However, the program has been equally, if not more, important in advancement of the science of oceanography. In the last decade, the field has progressed from one largely descriptive in nature (asking what) to one of carefully designed experiments and expeditions to study specific phenomena (asking why). In addition, the program has had many accomplishments of significant and immediate value to the Navy and has pro-

vided a wealth of scientific and operationally important information to the operating environment of the Navy.

Some of the more readily identifiable contributions to the Navy from this program include the fundamental ocean wave research effort from which has been developed the Navy Oceanographic Office ship routing and wave forecasting programs. The most complete library of bio-acoustic sources in the United States has been compiled as a part of the long-term support of a program to identify and catalog such background in the ocean. This library has been the source of valuable information to the operating forces. The present deep research vehicle program in the Navy received its initial start in this country through the ONR program. ONR personnel participated in the work of the bathyscaph Trieste off Italy in 1957 and later brought it to the United States and developed interest for its use in this country for research. This was the only deep rescue vehicle available for the Thresher search, in which most of the participants were laboratories sponsored by the ONR contract research program. The methods used by these groups in the search were direct applications of equipment developed under the research program and represented the forefront of the state of the art at that time. Most of the geophysical methods being employed in the present extensive Navy Oceanographic Office Marine Geophysical Surveys (MGS) program were also either developed or improved under the ONR-sponsored oceanography program.

These are a few of the direct benefits of the program to the Navy. Other scientific results are presently but a step from Naval applications and will require further pursuit or translation to specific Navy needs. Among such efforts is the long-range buoy development. The Coast Guard is already adapting the ONR-sponsored Convair buoy system as a replacement for light ships and Navy buoy programs likewise will benefit from this systematic development program.

The new study of oceanic dynamics, ranging from descriptive studies of current systems to the development of models to describe oceanic motions, will significantly contribute to the Navy's environmental forecasting efforts. These efforts are only in their infancy.

The scientific content of the oceanography program also has undergone shifts in emphasis over the years. Originally so little was known about the oceans that broad-scope programs were encouraged to obtain an adequate description from which meaningful questions could be asked and models of phenomena developed. Support for an oceanography effort of wide scope will continue to provide basic knowledge about the oceans to meet future Navy needs, but the relative emphasis of areas of research have been more sharply defined over the years. The physical oceanography and marine geophysics have been emphasized as being of most immediate interest to a wide variety of Naval applications. The marine geophysics area, in particular, has received increased emphasis because of its growing importance to undersea warfare. New programs were initiated at the Graduate Center of the Southwest and the University of Hawaii, and the effort of the Lamont Geological Observatory has undergone considerable expansion. More recently greater emphasis has been placed on air-sea interaction in response to a recognized need for increased effort in this area as noted by both the Academy of Sciences and the Interagency Committee on Oceanography (ICO). Among the areas receiving less relative emphasis in the physical oceanography program have been biological oceanography and geochemistry.

Large coordinated programs also have been commenced. The Convair buoy project and other associated programs, such as that for sensor package development at Bissett-Berman and mooring line studies at General Motors, are examples of such programs. The developing oceanic dynamics program is another example, but involving more directly scientific groups. It is anticipated that the trend towards such coordinated problem-oriented projects will increase.

In order to keep a dynamic program, new projects are started each year and others phased out. The number of new starts varies annually depending on available funds, long-term commitments, and rate of project turnover. New starts have amounted to 10–15 percent per year. These have included new contracts and the addition of new tasks to existing contracts.

The increased efforts by most of the other Federal agencies, because of their in-house nature, have not significantly affected either the scientific content or groups supported by ONR. The NSF, with a somewhat comparable role for supporting oceanography, has provided facilities and supporting research at an increasing rate and, as noted before, is being looked to for broad institutional support. Rather than being a duplicating effort, however, the NSF program has provided many facilities not available to the ONR program. Much oceanographic research is exceedingly expensive, particularly when ship support is considered. Therefore, selected, jointly supported efforts of considerable research value to the Navy and the nation can be obtained which, because of their cost, might not have been otherwise supported within the budget limitations of a single agency.

Besides NSF, the Atomic Energy Commission is the only appreciable supporter of research at the institutions and universities. Its program is, in general, conducted by selected groups which are concerned with fall-out and diffusion problems. The newly emerging Environmental Science Services Administration (ESSA) has a limited in-house research effort which, in some cases, is cooperating with several on-going ONR oceanography programs, the most noticeable of which is the Gulf Stream investigation. Because ESSA has been assigned responsibility for tsunami (tidal wave) warning, the previously supported ONR work at the University of Hawaii has been taken over by that agency through mutual agreement.

Oceanography, using the very broad definition accepted by the Panel of the President's Science Advisory Committee, is as stated in its report, a field of activity in which it must be expected that the Navy, more than any other agency of the United States, will continue to be active.

Engineering to do new types of jobs, or to do old types better, will continue to demand a heavy effort. In partnership with industry, the Navy is advancing the field rapidly as is the petroleum industry. Each has its own peculiar problems which demand solution, but benefits from interchange of technological advances. Navy's effort will perforce grow rapidly and provide much of the technological base for the rest of the community with marine interests.

In exploratory development, or applied research, the task is to explore in depth the possibility of gaining military advantage from a new development in science, or of rapidly closing scientific gaps that have led to recognized problems. This part of the Navy's oceanographic program must be greatly strengthened and confined more closely to its goals. Because so much of the basic science was in a very rudimentary state, there has been a tendency for diversion of effort into fundamental research and a blurring of goals. This should now be sorted out so that a stronger program in both basic and applied research can emerge.

The basic research mission is so defined that working towards the solution of recognized and defined problems must not be the motive. The effectiveness of this effort must never be judged on the basis of how it performs the task of the applied research community, i.e., how it delivers quick solutions to today's problems. Nevertheless, any mission-oriented agency must use judgment in supporting basic research in those fields that have the potential of uncovering new knowledge that will give an advantage in fulfilling the mission. In the broadest sense this commends basic research in ocean science to the Navy. The Navy of the future will be shaped by the developing understanding of the environment in which it operates just as today's Navy has been shaped by basic oceanographic knowledge not available a few years or a few decades ago. It is critical to Naval development that ocean science progresses rapidly and on a very broad front.

Since the results of basic research end up quickly in the public realm, the Navy can, and does, benefit from

research sponsored by other agencies. This is particularly true with research sponsored by the National Science Foundation, where the motivation is purely that of doing good science. Dependence upon research support from such other sources could, however, be dangerous. The Navy must continue to plan a dominant role in the support of basic ocean science in order that major parts of the national effort go into those phases of the science which are judged to have the greatest potential for Naval application, and no broad area is neglected because of changing fads in the research community.

Within the broad-fronted scientific program, emphasis will change from year to year as our realization of potential applicability grows. In the immediate future stress will be placed on the following areas:

- Oceanic Dynamics—Theoretical and observational studies of all scales and modes within the ocean. A carefully developed plan for this program has been developed by Woods Hole.
- Air-Sea Interaction—All aspects of the exchange of energy and material between ocean and atmosphere, including the resulting modification of conditions within each fluid. Scripps have evolved a plan for studying this problem on a large scale in the north Pacific.
- Chemistry of the Ocean—Organic and inorganic reactions as they take place in the ocean and their influence upon the environment.
- Benthic Boundary Layer—Studies of the conditions near the interface between ocean and underlying bottom both in the water and sediments.
- Crustal and Subcrustal Structures—Studies of the make-up of the solid earth beneath the sea as inferred from all available geophysical observations.
- Bottom Layer Studies—Studies having to do with the nature of the surficial sediments which make up the outer layer of the sub-ocean crust.
- Biological Concentrations—Especially the factors that lead to concentrations which influence the medium for acoustic transmission.

Research provides the base on which Navy missions of the future can be conducted. By stating hypothesized missions of the future, applied research can be structured to a great extent. The technological gaps can be ascertained. Within the limits of judicious planning and funding, some order of semblence can be made out of the process of supporting certain proposals and rejecting or re-directing others. The hypothesized missions used for structuring the Deep Sea Research Program in ocean technology are:

- Occupation for the purpose of exploitation of critical ocean floor sites on the continental shelf off the United States; sea mounts located near the United States; continental slopes off the United States; and the foregoing, but located elsewhere in the world. Capability is to include the use of both dry submersibles with and without exterior manipulators and ambient pressure (equalized) fixed or mobile SEALAB habitats.
- Salvage, recovery and oceanographic rescue operations in ocean waters to 20,000 feet.
- Installation and control and operation of weapon systems on the floor in continental shelf areas contiguous to the United States and extending depthwise as a function of time to the abysmal plain taking into special consideration sea mounts and ridges, such systems to be both manned and unmanned locally.
- Installation and operation and surveillance systems both on the ocean floor and at mid-depth taking advantage of the ocean floor topology and sound propagation channels, such systems to be both manned and unmanned locally.
- Provision of the necessary undersea technical support or technology to enable the national expansion and exploitation of the offshore resources by industry in conjunction with other Government agencies, such technology to include, but not be limited to, life support, vehicles, tools and communications.

It would be foolish to suggest that the Navy's basic research program could be strong in all phases of ocean science and technology, especially in the face of the rapid expansion of the field. Cautious reduction of support is and continue to be justified in areas where agencies with different missions show evidence of giving adequate support, or in areas where it is suspected that the chances of Naval application are remote. For example, the study of commercial fishes can well be left to the Bureau of Commerical Fisheries, although their distribution and abundance, as well as the distributed effort to catch them, is of military significance. The study of tsunamis, once sponsored entirely by ONR, has been entrusted to the Coast and Geodetic Survey as, under an assigned responsibility, the competence in that agency grew to accept it. In the study of coastal processes Navy's support has grown less rapidly because of an excellent program in the Army Corps of Engineers. Emphasis has been on coordinating these so that jointly the complementary studies serve the clear needs of both agencies.

Departure from the traditional methods in program management are being planned. For example, while major support for an effort may go to a single institution, provision for planning input and research participation by competent investigators from a number of institutions will be specified. Related parts of the program, vested in different groups, will be reviewed in context, and subjected to integrated funding and forward planning. It will probably be necessary to provide for parallel technological development for the instrumentation needed. The competence of American industry should be brought to bear upon this task.

DOD Value Engineering Conference Set for Fall

"The Role of Value Engineering in Support of Management Objectives," is the theme of a Defense Department in-house engineering conference to be held in the Washington, D.C., area Sept 12–14, 1967.

The Department of the Army will host the three-day conference. Representatives of the Army, Navy, Air Force, Marine Corps, and Defense Supply Agency will participate.

Purpose of the conference is to stimulate interest and increased effort to improve value engineering support of management objectives in the development, acquisition and support of defense systems, equipment and facilities.

Conference papers are being solicited on the following subjects:

- Practical methods for integrating value engineering into the life-cycle management of DOD systems, equipment, facilities, material and procedures in: program/project management, logistic support management, procurement management, and contract administration.
- Economic and functional gains achieved through injection of value engineering in program/project, logistic support, and procurement management, and contract administration.
- What is needed to provide a continuing current measure of the effectiveness of value engineering in the Defense Department.

The September meeting will mark the second DOD in-house conference on value engineering. The first was held in 1964.

Director of Laboratories Post Created by AFSC

A new agency, the Director of Laboratories (DOL), has been established within Headquarters, Air Force Systems Command (AFSC). The Commander, AFSC Research and Technology Division (RTD), Bolling AFB, Washington, D. C., has assumed the position of Director of Laboratories as an added responsibility.

The DOL and his staff, located at Andrews AFB, Md., will provide policy and technical direction to all phases of the programs and activities of the eight AFSC laboratories and monitor their operations to ensure a capability to respond promptly to the changing needs of the Air Force. These functions were previously provided by RTD and the AFSC Deputy Chief of Staff for Science and Technology.

With the establishment of a director of laboratories at the AFSC staff level, Air Force technological needs can be more readily identified and integrated into the overall planning, programming, and resources allocation of its laboratories.

SUMMER JOBS FOR YOUTH

[Editor's note: The following is a statement issued by President Lyndon B. Johnson on the 1967 Youth Opportunity Campaign.]

Woven into the national fabric are threads that weaken it—that make it sometimes ravel or tear. One of these threads is unemployment, particularly among youth.

Hundreds of thousands of young people walk the city streets and rural roads in search of meaningful employment. Hundreds of thousands more work part-time at tasks that bring them neither monetary nor emotional satisfaction.

In the last two years, we have been reaching out to help them with special summer employment programs. In 1965, the first Youth Opportunity Campaign created a million extra jobs for young men and women between the ages of 16 and 21.

We bettered that effort in 1966, when America's response to the need for "Summer Jobs for Youth" produced more than a million new opportunities.

Now, in June 1967, two million youngsters will join the job market who will have no help unless it is ours. Many of them could be on their way to becoming tomorrow's replacements for the left-behind Americans of today—unless a continued effort is made by private industry, by American labor, and by local, state and Federal governments to prevent that from happening.

To help these youngsters help themselves I am asking the Vice President, as Chairman of the new President's Council on Youth Opportunity, to appoint task forces of responsible leaders in 80 major cities of our nation, who will give their time and efforts to finding summer jobs and opportunities for those young people who most need help.

Theirs will be a great task, but they cannot do it alone. They must have the support and cooperation of all our people. I am asking for that cooperation now.

The Private Employer's Role.

The private employer supplied the great majority of the more than one million extra opportunities last year. Again his help is most essential of all.

Thousands of smaller businesses and offices throughout the land, who have already demonstrated a willingness to help in this endeavor, can do so again.

Governors and Mayors, labor unions, trade associations, civic and fraternal groups, churches and colleges have already demonstrated that they can find extra places for our young citizens. They can do so again.

It is important that we begin immediately.

Many employers will hire extra help directly this summer. Others will hire young persons through their local state employment service offices. In either case, I ask that word of what they have done, including the name of the trainee, be forwarded by mail to:

The Vice President
of the United States
Youth Opportunity
Campaign Unit
Washington, D.C. 20500

It will be appropriately acknowledged.

All boys and girls 16 through 21, who want to work this summer and who do not have assured jobs, should immediately contact the nearest State Employment Service office. If this is difficult, write to the Department of Labor, Youth Opportunity Campaign Unit, Washington, D.C. 20210.

The Federal Government's Role.

I am again directing the Government departments and agencies to lead this campaign. They should make every effort to find meaningful work or training opportunities this summer for young men and women.

These opportunities will be given so far as is practicable to those boys and girls, aged 16 to 21, who need them most because of their economic or educational disadvantages.

The young men and women, who want a chance to work and who are denied that chance, cost this country more than it can afford.

All America can help them help themselves. We do it for the sake of the American to come.

DEPARTMENT OF DEFENSE

Joseph J. Liebling has been selected for the post of Dir., Security Policy, Office of Asst. Secretary of Defense (Administration). He replaces Walter T. Skallerup who has returned to private law practice.

Robert W. Taylor has been appointed Dir. of Information Processing Techniques of the Advanced Research Projects Agency (ARPA). He succeeds Dr. Ivan Sutherland who left ARPA to join the faculty at Harvard University.

RAdm. Roy G. Anderson, USN, has been designated as Senior Navy Member, Military Studies and Liaison Div., Weapons Systems Evaluation Group, Office of Dir., Defense Research and Engineering.

Col. Fred L. Rennels Jr., USAF, has been assigned as Dir. of Contract Administration Services, Office of Asst. Secretary of Defense (Installations & Logistics).

Lt. Col. Travis M. Gafford, USA, has been assigned to the Business and Labor Div., Office of Asst. Secretary of Defense (Public Affairs).

DEPARTMENT OF THE ARMY

Col. Thomas W. Davis III, Project Manager for Combat Vehicles at Army Weapons Command, Rock Island, Ill., has retired from the Army.

The following new assignments have been made at Army Weapons Command, Rock Island, Ill.: Lowell B. McClain, Commodity Manager for the Commando V100 Armored Car; Frank X. Connolly, Commodity Manager for Automatic Data Systems within the Army in the Field (ADS AF); and George Burdick, Commodity Manager of the M102 Howitzer System.

Col. Stanton W. Josephson has been appointed as Dir., Materiel Testing Activities, Development and Proof Services, Aberdeen Proving Ground, Md.

Col. Franklin B. Moon will become District Engineer for the Army Corps of Engineers at Galveston, Tex. this summer, succeeding Col. John E. Unverferth, who is retiring.

Col. John C. Raaen Jr. succeeds Col. Charles D. Y. Ostrom Jr. in the three-hat position of Commander, Army Ballistic Research Laboratories, the Human Engineering Laboratories, and the Chemical and Coating Laboratory, at Aberdeen Proving Grounds, Md.

Col. John G. Redmon has been named Project Manager for the Hawk Missile System at the Army Missile Command, Redstone Arsenal, Ala.

Col. Albert M. Steinkrauss, Dir. of Procurement and Production, Army Aviation Materiel Command, St. Louis, Mo., since 1964, has retired from military service.

Lt. Col. Robert A. Filby has assumed duty as Chief, Flying Crane Project Manager Office, Army Aviation Materiel Command, St. Louis, Mo.

ABOUT PEOPLE

Lt. Col. William C. McHugh has been reassigned as Chief, Future Missile Systems Div., Army Missile Command, Redstone Arsenal, Ala.

Lt. Col. John E. Wagner has assumed duties as Commanding Officer, Army Cold Regions Research and Engineering Laboratory, Hanover, N.H., succeeding Col. Dimitri A. Kellogg.

DEPARTMENT OF THE NAVY

The following flag officer assignments have been made:

VAdm. John S. McCain Jr., (selected for promotion to the grade of admiral) Commander in Chief, U.S. Naval Forces, Europe; VAdm. Lawson P. Ramage, Commander, Military Sea Transportation Service, Washington, D.C.; VAdm. Waldemar F. A. Wendt, Dep. Chief of Naval Operations (Plans & Policy); RAdm. Horace V. Bird, Commander, Mine Forces, Pacific; RAdm. Constantine A. Karaberis, Commander, Fleet Air, San Diego, Calif.; RAdm. Stephen Sherwood, Commanding Officer, Naval Supply Depot, San Diego, Calif.; RAdm. Harry N. Wallin, Commander,

(*Continued on Page 40*)

Two New Deputies Appointed in OASD (Public Affairs)

Two veteran journalists, Daniel Z. Henkin and Richard Fryklund, have been appointed as deputies to the Assistant Secretary of Defense (Public Affairs) Phil G. Goulding.

In announcing the appointments, Secretary of Defense Robert S. McNamara stated, "Working with Assistant Secretary Phil G. Goulding, Deputy Assistant Secretaries Dan Henkin and Dick Fryklund will be key members of a team with unparalleled military news experience—a total of more than 45 years—in covering national defense."

Mr. Henkin has been serving as Director of Operations, Office of Assistant Secretary of Defense (Public Affairs), since October, 1965. A veteran military affairs reporter and former editor of the *Journal of the Armed Forces*, Mr. Henkin, 43, is a native of Washington, D.C., and a graduate of the University of California. He served during world War II as a Coast Guard combat correspondent.

Born in Denver, Colo., Mr. Fryklund, 45, is a graduate of the University of Minnesota, and served in Europe during World War II as an Air Force night fighter radar observer. Prior to his appointment as Deputy Assistant Secretary, Mr. Fryklund served as military writer for the *Washington Evening Star*, from which he has taken an indefinite leave of absence. He was European correspondent for the Star from 1956 to 1958, and has been the Star's military writer covering the Pentagon since 1959. In that period he has made five reporting trips to South Vietnam and the Far East.

Assistant Secretary of Defense (Public Affairs) Phil G. Goulding in a discussion with his two new deputies, Daniel Z. Henkin (left) and Richard Fryklund (right).

(Continued from Page 39)

Naval Facilities Engineering Command, Atlantic Division, Norfolk, Va., RAdm. William F. Petrovic, Commander, Puget Sound Naval Shipyard, Bremerton, Wash; and RAdm. Edward A. Ruckner, Dep. Chief of Naval Operations (Development).

The following captain assignments have been made:

Capt. Edwin E. McMorries, Dir. of Procurement, Office of Asst. Secretary of the Navy (Installations & Logistics); Capt. Thomas J. Christman, Commanding Officer, Naval Ammunition Depot, Crane, Ind.; Capt. Clyde E. Fulton, Commanding Officer, Naval Supply Depot, Mechanicsburg, Pa.; Capt. Grady H. Lowe, Commander, Naval Ordnance Test Station, China Lake, Calif., relieving Capt. John I. Hardy, who is retiring; Capt. William M. Nicholson, Dir., Deep Submergence Systems Project Office, Chevy Chase, Md.; and Capt. Thomas B. Owen (rear admiral selectee) to succeed RAdm. John K. Leydon as Chief of Naval Research on June 30, 1967; and Capt. Perry M. Boothe, Dep. Commander, Naval Facilities Engineering Command, Southwest Div., San Deigo, Calif.

DEPARTMENT OF THE AIR FORCE

The President has nominated to the Senate the following named officers for appointment to the temporary general officer grades indicated:

To Major General.

Brig. Gen. Charles H. Roadman, Commander, Aerospace Medicine Div., AFSC; Brig. Gen. Paul T. Cooper, Commander, Space Systems Div., AFSC; Brig. Gen. Joseph S. Bleymaier, Commander, Air Force Western Test Range, AFSC; Brig. Gen. Robert H. McCutcheon, Dir. of Procurement & Production, AFLC; Brig. Gen. Ernest A. Pinson, Commander, Office of Aerospace Research; Brig. Gen. Albert W. Schinz, Commander, Air Force Tactical Air Warfare Center; Brig. Gen. Richard D. Reinbold, Dep. Dir. of Plans, Office of Dep. Chief of Staff (Plans & Operations), Hq. USAF; Brig. Gen. William C. Garland, Dep. Dir. of Information, Office of the Secretary of the Air Force; Brig. Gen. Guy H. Goddard, Dep. Dir. for Construction, Office of Dep. Chief of Staff (Programs & Resources), Hq. USAF.

To Brigadier General.

Col. David V. Miller, Vice Commander, Space Systems Div., AFSC; Col. Allison C. Brooks, Commander, Aerospace Rescue & Recovery Service, MAC; Col. Raymond A. Gilbert, Vice Commander, Research & Technology Div., AFSC; Col. Robert J. Meyer, Dir., Procurement Policy, Office of Dep. Chief of Staff (Systems & Logistics), Hq. USAF; Col. Guy M. Townsend, Systems Program Dir., C-5A Systems Program Office, Aeronautical Systems Div., AFSC; Col. Robert A. Berman, Dep. Dir., Maintenance Engineering, AFLC; Col. Albert R. Shiely Jr., Vice Commander, Electronic Systems Div., AFSC; Col. McLean W. Elliott, Dep. for Range Operations, Air Force Eastern Test Range, AFSC.

Maj. Gen. James T. Stewart has been reassigned as Vice Dir., Manned Orbiting Laboratory (MOL). Brig. Gen. Walter R. Hedrick Jr., replaces Gen. Stewart, as Dir. of Space in the Office of the Dep. Chief of Staff (Research and Development), Hq., USAF. Brig. Gen. Joseph S. Bleymaier, has been named Dep. Dir., MOL, with additional duty as Dep. Commander, Space Systems Div. (AFSC), for MOL.

Walter Sexauer has replaced Joseph J. Liebling as Asst. for Security and Trade Affairs, Office of Dep. Chief of Staff, (Systems & Logistics) and Office of the Dep. Chief of Staff, (Research & Development) Hq., USAF.

New assignments in the Air Force Systems Command are: Maj. Gen. Vincent G. Huston, Dep. Chief of Staff (Operations), Hq., AFSC; Maj. Gen. David M. Jones, Commander, Air Force Eastern Test Range, Patrick AFB, Fla.; Col. Harwell L. Boyd Jr., Dep. System Program Dir., 416/418, Electronics Systems Div.; Col. John P. Clowry, Chief, SACCS Projects Office, Electronics Systems Div.; Col. James R. Finton, Dir., Engineering Standards and Technical Information, Systems Engineering Group; Col. Paul Baker Jr., Chief, Systems Engineering Div., MOL Program, Hq., AFSC; Col. John C. Beals, Dir., Civil Engineering, Arnold Engineering Development Center, Tenn.; Col. Winston H. Clisham, Dep. for Civil Engineering, Aeronautical Systems Div.; Col. Roy R. Croy Jr., Asst. Dir., Test, Arnold Engineering Development Center, Tenn.; Col. Joseph E. Duval, Chief, Engineering and Evaluation Div., Armament Development Laboratory (RTD), Eglin AFB, Fla.; Col. Charles E. Jerman, Dep. for Civil Engineering, Air Force Flight Test Center, Edwards AFB, Calif.; Col. David R. Jones, Dir., Air Force Weapons Laboratory, Kirtland AFB, N.M.; Col. Donald J. Keeffe, Chief, Procurement Div., Ballistic Systems Div.; Col. Harrison E. Kee Jr., Chief, Command and Surveillance Div., Research and Technology Div.; Col. Ralph W. Kiser, Chief, Communications, Electronics Systems Div., Hq., AFSC; Col. Robert G. Newbern, Dir., Range Safety Div., Air Force Eastern Test Range, Patrick AFB, Fla.; Col. Victor C. Wegenhoft, Chief, Plans Div., National Range Div., Patrick AFB, Fla., Col. Walter Schlie, Dir., Reconnaissance Survivability and Electronic Warfare, Hq., AFSC; Col. Warren T. Whitmire, Dir., AFWET Div., Air Proving Ground Center, Elgin AFB, Fla.; Col. William C. Marett, Dir. of Bioastronautics, Hq., AFSC; Lt. Col. John J. Whiteside, Dir. of Information, Aeronautical Systems Div.

Col. Duane A. Kuhlmann, has been named Chief F-102/106 System Support Manager Div., Directorate of Maintenance Management, San Antonio Air Materiel Area, Kelly AFB, Fla.

Col. Henry G. Hamby Jr., has assumed duties as Dep. Commander, Mobile Air Materiel Area, Brookley AFB, Ala. He relieved Col. John McCorkle who has retired.

Col. John J. Bennett has been assigned as Executive to the Dep. Under Secretary of the Air Force (Manpower).

Col. William H. Lake, has been assigned as Secretary, Scientific Advisory Board, Hq., USAF.

President Johnson Sets National Transportation Day

President Lyndon B. Johnson, in response to a joint resolution of the U. S. Congress, has designated Friday, May 19, 1967, as National Defense Transportation Day, and the week beginning May 14, 1967, as National Transportation Week.

In his proclamation the President urges all American citizens to participate with the transportation industry, the Armed Services and other Government agencies in the observance of these occasions through appropriate ceremonies. The observance of National Defense Transportation Day and National Transportation Week will give the citizens of each community the opportunity to recognize and appreciate fully the vital role our great and modern transportation system plays in their lives and in the defense of the nation.

Local and Short Haul Carriers Forum Set

The Defense Department and General Services Administration will participate in a special forum on "How To Do Business With The U. S. Government," for companies exhibiting at the Local and Short Haul Carriers 1967 National Trucking Exposition to be held at the Edgewater Beach Hotel, Chicago, Ill., May 15–17, 1967. The forum is scheduled for Tuesday, May 16, at 10:30 a.m.

Presentations will be made by each agency to be followed by a question and answer session during which exhibitor representatives may inquire into the various aspects of doing business with the Government. The speakers at the forum will be George H. Wilson, Small Business Advisor, U. S. Army Tank-Automotive Center, Warren, Michigan; and Joel L. Leckness, Regional Director of Business Affairs, General Services Administration Region Five, Chicago, Ill.

There will be no charge for attendance at the forum. For additional information contact: Local and Short Haul Carriers National Conference, 1616 P St. NW, Washington, D. C. 20036.

Constructive Change Orders

[*Editor's Note: The following article, which contains information of interest to industry, is reprinted from the* Headquarters Naval Material Command Procurement Newsletter.]

The wording of the Changes clause in Government contracts, and the requirement in Armed Services Procurement Regulation (ASPR) 16–815.1 for the use of Change Order Form DD 1319, would lead one to believe that a formal, written change order must be issued by the contracting officer to entitle the contractor to an equitable adjustment under the Changes clause. However, that is not the case; the contracting officer and other personnel may, in informal communications or by their course of conduct, generate price increases and time extensions without intending to or even being aware that they are doing so.

The Changes clause expressly provides for equitable adjustments only where the changes are made "by written order" of the contracting officer (or his authorized representative). But the courts and appeals boards hold that a "constructive" change order results, the same as if the contracting officer had issued a written order on the prescribed DD Form, when the contractor is required by the words or conduct of authorized Government representatives to perform different or additional work under the contract. Words effecting the change may be written or oral; and directive words, such as "order," "direct," or "require," need not be used if the contractor's work is, in fact, changed. A change may result from a failure to act as well as from a positive course of conduct. But a "constructive" change does not occur unless the contracting officer, or his authorized representative, has authority to take the action that generates the increased costs or time required for performance.

Examples of circumstances under which constructive change orders may arise are:

• When an inspector or contracting officer unjustifiably rejects work, thereby requiring the contractor to perform rework or additional work not required by the contract.

• Where inspectors or other authorized personnel require excessive tests or a higher standard of performance than called for by the specification.

• Where the contractor's costs are increased by a change in the time, place, or manner of inspection, or in quality control requirements.

• Where the contract does not specify how the work is to be done and the Government's representative insists that it be done in a certain way, although the work could be performed satisfactorily by a less expensive method.

• Where the contractor incurs additional costs because he is forced by action of the cognizant Government official to alter the sequence in which the work is performed.

• Where, based on a misinterpretation of the contract, the contracting officer directs performance not legally required by the contract.

• Where the contractor is entitled to a time extension because of an excusable delay, and the contracting officer acts in such a way as to require the contractor to adhere to the original contract performance schedule despite notice of the contractor's claim to an extension of time. This is called "acceleration" of performance. It may also occur where the contracting officer recognizes an excusable delay, but for a shorter period than is justified, so that the time extension granted is insufficient and the contractor is forced to speed up the work.

• Similarly, where the Government's specifications contain inconsistencies or other errors, the correction of which is, in fact, required for performance of the contract work contemplated by the parties. In such a case the contractor has been entitled to an equitable adjustment under the Changes clause to compensate him for extra work caused by the defects in the specifications, even though the increase in cost was not caused by an express change order.

The proper method of effecting required changes is by written change orders which are expressly provided for in the contract and under which both parties are aware of their rights and obligations in regard to the change. Constructive changes should be avoided; they often impose improper demands on the contractor, increase unnecessarily the Government's financial obligations, and result in unintended time extensions. They can more readily be avoided if personnel administering contracts have an understanding of what conduct might be considered to constitute constructive changes. Frequently, such changes are due to the contract administrator's lack of understanding of the Government's contractural rights. The advice of Counsel is especially desirable in these cases, and will be helpful generally in situations where constructive change orders may arise.

Navy Establishes Buying Command in Oakland, Calif.

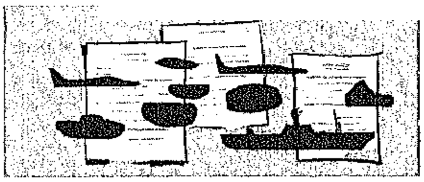
An Area Buying Command has been established at the Naval Supply Center, Oakland, Calif., to exercise technical direction, on a trial basis, over field purchasing offices within the 12th Naval District (Northern California and Nevada).

The Navy Field Purchase System, which includes the purchase elements of more than 200 naval activities world-wide, has been centrally managed from Headquarters, Naval Supply Systems Command, in Washington, D.C., in the past. However, Supply Systems Command is now considering the feasability of transferring a number of functions to locations closer to field purchasing activities and their customers.

The Area Buying Command (ABC) was established at Oakland as a test of the concept of partial decentralization. A major aim is to determine how well ABC can effect the economies of consolidated buying by standardizing procedures and eliminating duplications of purchases.

Rear Admiral Edward F. Metzger, Commanding Officer, Oakland Naval Supply Center, is ABC's commander. Vice commander is Commander Davis L. Webb who directs Oakland Naval Supply Center's Purchase Department. The ABC office is in Building 311–3.

ABC's first major operational task will be to conduct an inventory of area purchase requirements and resources. From the results of this inventory, the first to be undertaken by the Navy, ABC will construct a purchase management master plan for the 12th Naval District to match area purchase resources with requirements.



DEFENSE PROCUREMENT

Contracts of $1,000,000 and over awarded during the month of March 1967:

DEFENSE SUPPLY AGENCY

1—**Genesco, Inc.,** Florence, Ala. $2,034,807. 779,160 pairs of men's light-weight winter drawers. Defense Personnel Support Center, Philadelphia, Pa.

—The Defense Fuel Supply Center, Alexandria, Va., has issued the following conracts for 115/145 aviation gasoline:

Cities Service Oil Co., New York, N.Y. $3,122,645. 19,839,000 gallons.

Phillips Petroleum Co., Bartlesville, Okla. $1,939,140. 11,340,000 gallons.

Mobil Oil Corp., New York, N.Y. $1,796,928. 11,760,000 gallons.

Shell Oil Co., New York, N.Y. $1,400,280. 8,400,000 gallons.

6—**Fruehauf Corp.,** Fullerton, Calif. $5,339,452. 12,426 reusable metal shipping boxes. Defense General Supply Center, Richmond, Va.

—**Fab-Weld Corp.,** Simpson, Pa. $2,913,897. 8,284 reuseable metal shipping boxes. Defense General Supply Center, Richmond, Va.

7—**Salada Foods, Inc.,** Woburn, Mass. $1,142,251. 1,171,512 pounds of black tea in individual bags. Defense Personnel Support Center, Philadelphia, Pa.

—**Lester D. Lawson & Co.,** Long Beach, Calif. $4,816,099. 148,740 cases of ration supplement—sundries pack. Defense Personnel Support Center, Philadelphia, Pa.

8—**Texaco Co., Inc.,** New York, N.Y. $1,960,800. 1,200,000 barrels of No. 6 fuel oil. Defense Fuel Supply Center, Alexandria, Va.

—**Standard Oil Company of California,** San Francisco, Calif. $1,636,100. 930,000 barrels of No. 6 fuel oil. Defense Fuel Supply Center, Alexandria, Va.

9—**International Harvester Co.,** Melrose Park, Ill. $1,264,982. 60 full-tracked diesel engine-driven tractors with concurrent spare parts. Melrose Park. Defense Construction Supply Center, Columbus, Ohio.

10—**General Fire Extinguisher Corp.,** Northbrook, Ill $1,032,323. 71,000 fire extinguishers. Defense Construction Supply Center, Alexandria, Va.

—The Defense Fuel Supply Center, Alexandria, Va., has awarded the following contracts for diesel and fuel oil:

Mobil Oil Corp., New York, N.Y. $2,767,419 103,259 barrels diesel fuel. 1,241,400 barrels #6 fuel oil.

Gulf Oil Corp., Houston, Tex. $1,688,737. 12,000 gallons gasoline, 77,000 barrels diesel fuel, 166,700 barrels #6 fuel oil.

Humble Oil & Refining Co., Houston, Tex. $1,09,,681. 25,750 barrels diesel fuel. 411,300 barrels #6 fuel oil.

Metropolitan Petroleum Co., New York, N.Y. $1,078,300. 526,000 barrels #6 fuel oil.

13—**Dow Chemical Co.,** Midland, Mich. $2,274,000. Chemicals. Defense General Supply Center, Richmond, Va.

14—**Sparling Mills, Inc.,** Greenville, R.I. $8,350,000. 20,000,000 polypropylene sandbags. Defense General Supply Center, Richmond, Va.

15—**Royal Lubricants Co.,** Hanover, N.J. $2,015,886. 565,306 gallons of aircraft turbine engine lubricating oil. Defense Fuel Supply Center, Alexandria, Va.

16—The Defense Personnel Support Center, Philadelphia, Pa., has awarded the following contracts for tropical combat boots:

Safety First Shoe Co., Nashville, Tenn. $4,763,346. 444,342 pairs.

Endicott Johnson Corp., Endicott, N.Y. $3,130,460. 283,704 pairs.

Wellco Research Industries, Waynesville, N.C. $1,715,613. 160,638 pairs.

17—**Morris Bros. Inc.,** New York, N.Y. $2,797,868. 1,600,000 cotton bed sheets. Defense Personnel Support Center, Philadelphia, Pa.

21—**American Oil & Supply Co.,** Newark, N.J. $2,576,584. 565,306 gallons of aircraft turbine engine lubricating oil. Defense Fuel Supply Center, Alexandria, Va.

27—**California Steel & Tube,** Los Angeles, Calif. $1,203,150. 97,500 bunk beds. Defense General Supply Center, Richmond, Va.

—**Dixie Bedding Co.,** Miami, Fla. $3,981,788. 156,000 bunk beds. Defense General Supply Center, Richmond, Va.

28—**Wythe Tool & Machine, Inc.,** Brooklyn, N.Y. $1,256,979. 327,816 adjustable telescopic tent poles. Defense Personnel Support Center, Philadelphia, Pa.

—**United Aircraft,** East Hartford, Conn. $1,508,742. 2,021 sets of bearings and 13,870 individual bearings. Defense Industrial Supply Center, Philadelphia, Pa.

29—**LaCrosse Garment Mfg. Co.,** LaCrosse, Wis. $2,914,901. 850,000 tent shelter halves. Defense Personnel Support Center, Philadelphia, Pa.

—**Dow Chemical Co.,** Midland, Mich. $2,274,000. 800,000 gallons of a chemical. Defense General Supply Center, Richmond, Va.

ARMY

1—**G.G. Greene Enterprises,** Warren, Pa. $1,032,897. 5.56mm 10-round clips and magazine fillers. Warren. Frankford Arsenal, Philadelphia, Pa.

—**Boeing Co.,** Morton, Pa. $7,400,000. CH–47A helicopter configuration 1A and III product improvement program. Morton. Army Aviation Materiel Command, St. Louis, Mo.

—**Zenith Radio Corp.,** Chicago, Ill. $1,012,700. SM429 fuzes for the 2.75-inch rocket. Chicago. Harry Diamond Laboratories, Washington, D.C.

—**Atlantic Research Corp.,** Alexandria, Va. $3,000,000. XM22E2 mines. East Hanover, Mass. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Viz Mfg. Co.,** Philadelphia, Pa. $1,616,608. AN/AMT–4D and AN/AMT–12 radiosonde sets. Philadelphia. Army Electronics Command, Philadelphia, Pa.

2—**Stevens Mfg. Co.,** Ebensburg, Pa. $1,287,127. 7½-ton semi-trailers. Ebensburg. Army Tank Automotive Command, Warren, Mich.

—**Johnson Corp.,** Bellevue, Ohio. $1,029,701. 3½-ton trailers. Bellevue. Army Tank Automotive Command, Warren, Mich.

—**H. O. Boehme, Inc.,** Westbury, N.Y. $2,186,531. Teletypewriter sets and related equipment. Westbury. Army Electronics Command, Philadelphia, Pa.

—**ITT Gilfillan, Inc.,** Los Angeles, Calif. $2,382,500. Omni-directional mortar locating radar systems. Los Angeles. Army Electronics Command, Fort Monmouth, N.J.

—**Allis Chalmers Mfg. Co.,** York, Pa. $4,748,360. Work on the Webbers Fall Lock and Dam, Oklahoma Project. Gore, Okla. and York, Pa. Engineer Dist., Tulsa, Okla.

3—**General Steel Tank Co.,** Reidsville, N.C. $2,516,898. 60,000 gallon capacity fuel system supply points. Reidsville. Army Mobility Equipment Command, St. Louis, Mo.

—**KDI Corp.,** Cincinnati, Ohio. $1,849,220. Metal parts for 2.75-inch rocket fuzes. Cincinnati. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Institute for Defense Analyses,** Arlington, Va. $3,013,689. An 8-month extension for additional research and development for the Weapons System Evaluation Group of the Joint Chief of Staff. $4,000,000. An 8-month extension for additional research in technical fields for DDR&E and ARPA. Arlington. Defense Supply Service, Washington, D.C.

6—**Chrysler Motors,** Detroit, Mich. $1,034,677 and $3,428,772. Trucks. Warren, Mich. Army Tank Automotive Command, Warren, Mich.

—**Atlas Corp., and H. C. Smith Construction Co.,** Oakland, Calif. $1,352,378. 31 months of additional logistics support at Kawajalein Test Site. Nike–X Project Office, Redstone Arsenal, Huntsville, Ala.

7—**National Presto Industries,** Eau Claire, Wis. $3,966,802. Metal parts for 8-inch M106 projectiles, and for lifting plugs. Eau Claire. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Allis Chalmers Mfg. Co.,** York, Pa. $1,515,633. Work on the De Gray Dam and Reservoir, Arkansas Project. West Allis, Wis. and Arkadelphia, Ark. Engineer Dist., Vicksburg, Miss.

—**United Aircraft,** Stratford, Conn. $1,260,000. Component armor kits for CH–54A helicopters (Flying Crane). Stratford. Army Aviation Materiel Command, St. Louis, Mo.

—**Varo, Inc.,** Garland, Tex. $1,657,475. Classified electronic equipment. Garland. Army Electronics Command, Fort Monmouth, N.J.

—**Merando, Inc.,** Washington, D.C. $3,294,394. Construction of two 8-story wings as additions to the Sheridan Building at the Soldier's Home, Washington, D.C. Engineer Dist., Baltimore, Md.

8—**Philco-Ford Corp.,** Newport Beach, Calif. $4,559,200. Continuation of research and development on the Chaparral air defense missile system. Anaheim, Calif. Army Missile Command, Redstone Arsenal, Huntsville, Ala.

—**Webber Constructors,** Miami, Fla. $1,888,400. Work on the Four River Basins, Florida Project. Marion County, Fla. Engineer Dist., Jacksonville, Fla.

9—**University of Wisconsin,** Madison, Wis. $1,800,000. Continuation of operation of the Mathematics Research Center. Madison. Army Research Office-Durham, Durham, N.C.

—**FMC Corp.,** South Charleston, W. Va. $1,099,300. Road wheels for M113 vehicles. Los Angeles, Calif. Army Tank Automotive Command, Warren, Mich.

—**Hughes Tool Co.,** Culver City, Calif. $1,643,941. XM27E1 aircraft armament sub-systems for OH–6A helicopters. Culver City. Army Weapons Command, Rock Island, Ill.

10—The Army Electronics Command, Fort Monmouth, N.J., has awarded the following contracts for contract definition on the Tactical Fire Direction Systems:

I.B.M. Corp., Gaithersburg, Md. $1,065,969; **Litton Systems, Inc.,** Van Nuys, Calif. $1,416,374. **Burroughs Corp.,** Paoli, Pa. $1,216,841.

—**Morrison Knudsen Co., Perini Corp., Brown & Root, Inc., McLaughlin, Inc. and F & S Contracting Co.,** Seattle, Wash. $82,916,474. Work on the Libby Dam, Kootenei River Project. Libby, Mont. Engineer Dist., Seattle, Wash.

—**Federal Cartridge Corp.,** Minneapolis, Minn. $29,087,902. Ordnance components and Operations and Maintenance Activities. New Brighton, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**A. O. Smith Corp.,** Chicago, Ill. $4,005,516. Metal parts for M117A1 750-pound bombs. Waco, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Lockheed Aircraft,** Plainfield, N.J. $1,225,445. Range-only radar systems for the XM168 Weapons System. Plainfield. Frankford Arsenal, Philadelphia, Pa.

—**Chrysler Motors,** Detroit, Mich. $1,188,813. Various telephone utility maintenance trucks. Warren, Mich., Cardington, Ohio and Durant, Okla. Army Tank Automotive Command, Warren, Mich.

—**Raytheon Mfg. Co.,** Lexington, Mass.

CONTRACT LEGEND

Contract information is listed in the following sequence: Date—Company—Value—Material or Work to be Performed—Location Work Performed—Contracting Agency.

$3,000,000. Continued work on the improved Hawk. Bedford, Mass. Army Missile Command, Redstone Arsenal, Huntsville, Ala.

13—J H W, Inc., Dover, Del. $1,304,170. Construction of an intercepting sewer from Naha City to the Machinato Service Area, Okinawa. Engineer Dist., Okinawa.

—Hercules, Inc., Wilmington, Del. $8,876,532. Manufacturing miscellaneous propellants; loading, assembling and packing rocket motors; and operations and maintenance activities. Radford, Va. Ammunition Procurement & Supply Agency, Joliet, Ill.

—General Electric, Kansas City, Mo. $1,267,098. A generator for the Stockton Reservoir, Missouri Project. Schenectady, N.Y. and Stockton, Mo. Engineer Dist., Kansas City, Mo.

—Elmer J. Freethy Co., El Cerrito, Calif. $1,634,961. Work on the Walnut Creek Channel, California Project. Walnut Creek, Calif. Engineer Dist., Sacramento, Calif.

—Western Electric, New York, N.Y. $100,000,000. Continuing Nike-X research and development. Burlington, N.C., Orlando, Fla., Wayland, Mass., St. Paul, Minn., Syracuse, N.Y., Santa Monica, Calif., and Whippany, N.J. Nike-X Project Office, Redstone Arsenal, Huntsville, Ala.

14—Eltra Corp., Toledo, Ohio. $1,867,799. Batteries for 2½ and 5-ton trucks. Oakland, Calif. East Point, Ga., Redding, Pa., and Oklahoma City, Okla. Army Tank Automotive Center, Warren, Mich.

—White Motors, Lansing, Mich. $10,433,090. 2½-ton trucks. Lansing. Project Manager, General Purpose Vehicles, Michigan Army Plant, Warren, Mich.

—General Motors, Cleveland, Ohio. $4,000,000. Body and band assembly for 81mm projectiles. Cleveland. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Westinghouse Air Brake Co., Peoria, Ill. $2,722,132. Earth moving scrapers. Toccoa, Ga. Army Mobility Equipment Command, St. Louis, Mo.

—Cessna Aircraft Co., Wichita, Kan. $3,852,500. Bombs, including shipping and storage containers. Wichita. Ammunition procurement & Supply Agency, Joliet, Ill.

15—Piracci Construction Co., Baltimore, Md. $2,267,005. Construction of a three-story building for a major air command headquarters at Langley AFB, Va. Engineer Dist., Norfolk, Va.

—Hercules, Inc., Wilmington, Del. $6,384,605. 2.75-inch rocket components. Lawrence, Kan. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Grumman Aircraft Engineering Corp., Bethpage, N.Y. $2,914,900. Modification of four Mohawk aircraft. Bethpage. Army Aviation Materiel Command, St. Louis, Mo.

—Continental Motors, Muskegon, Mich. $2,259,900. Power packages for M48A4 tanks. Muskegon. Army Tank Automotive Command, Warren, Mich.

—General Motors, Indianapolis, Ind. $3,596,400. T-63-A-5A aircraft engines for LOH aircraft. Indianapolis. Army Aviation Materiel Command, St. Louis, Mo.

16—Airtronics International Corp., Fort Lauderdale, Fla. $1,560,777. Component parts of the fire control assembly for the M60 tank. Fort Lauderdale. Procurement Detachment, Chicago, Ill.

—Borg Warner Corp., Bellwood, Ill. $1,603,201. 30-cal, 8-round cartridge clips. Bellwood. Frankford Arsenal, Philadelphia, Pa.

17—American Air Filter Co., St. Louis, Mo. $1,179,789. Engineering development of a pressurized POD system. St. Louis. Edgewood Arsenal, Md.

—Bell Helicopter Co., Hurst, Tex. $2,000,000. Long lead time effort for additional AH-1G helicopters (Cobra). Hurst. Army Aviation Materiel Command, St. Louis, Mo.

20—International Harvester Co., Melrose Park, Ill. $1,605,107. Diesel-engine driven tractors. Chicago, Ill. Army Mobility Equipment Command, St. Louis, Mo.

—Continental Motors, Muskegon, Mich. $3,235,490. Multi-fuel engines for 5-ton trucks. Muskegon. Army Tank Automotive Command, Warren, Mich.

—Kaiser Jeep Corp., Toledo, Ohio. $12,640,044. 5-ton trucks with Government furnished, multi-fuel engines. South Bend, Ind. Project Manager, General Purpose Vehicles, Warren, Mich.

—Remington Arms Co., Bridgeport, Conn. $5,920,211. Loading, assembling and packing of miscellaneous small arms ammunition and components, and for operation and maintenance activities. Independence, Mo. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Farmers Tool & Supply Co., Denver, Colo. $1,217,657. Fin blades for 2.75-inch rocket motors. Denver. Picatinny Arsenal, Dover, N.J.

—Dirilyte Company of America, Kokomo, Ind. $1,027,500. Fin blades for 2.75-inch rocket motors. Kokomo. Picatinny Arsenal, Dover, N.J.

21—Gibbs Mfg. & Research Corp., Janesville, Wis. $1,192,800. Metal parts for rocket fuzes. Janesville. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Bell & Howell Co., Chicago, Ill. $2,126,950. Grenade fuzes. Chicago. Ammunition Procurement & Supply Agency, Joliet, Ill.

—International Harvester Co., Chicago, Ill. $5,852,466. School buses of various passenger capacity and gross vehicle weights. Fort Wayne, Ind.; Springfield, Ohio and Lima, Ohio. Army Tank Automotive Command, Warren, Mich.

—Boeing Co., Morton., Pa. $29,807,500. CH-47A (Chinook) helicopters and related data. Morton. Army Aviation Materiel Command, St. Louis, Mo.

22—Gibbs Mfg. & Research Corp., Janesville, Wis. $1,129,656. Fuze adapters for 81mm mortar cartridges. Janesville, Wis., and Chicago, Ill. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Davey Compressor Co., Kent, Ohio. $2,709,569. Rotary diesel engine compressors. Kent. Army Mobility Equipment Command, St. Louis, Mo.

—General Electric, Burlington, Vt. $3,467,802. 20mm automatic guns, with gun pods. Burlington. Army Weapons Command, Rock Island, Ill.

—TEMCO, Inc., Nashville, Tenn. $2,520,386. Metal parts for 105mm illuminating projectiles. Nashville. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Norris Industries, Inc., Vernon, Calif. $2,266,932. Metal parts for mine canisters. Brockton, Mass. and Vernon. Ammunition Procurement & Supply Agency, Joliet, Ill.

23—International Harvester Co., Melrose Park, Ill. $1,852,120. Diesel engine driven tractors. Chicago, Ill. Army Mobility Equipment Command, St. Louis, Mo.

24—Bouligny Co., Charlotte, N.C. $1,164,342. Mounts for 106mm rifles. Charlotte. Watervliet Arsenal, N.Y.

—Thermo King Corp., Minneapolis, Minn. $1,081,590. Trailer-mounted airconditioners. Minneapolis. Army Mobility Equipment Command, St. Louis, Mo.

—Pacific Ventures, Inc., Seattle, Wash. $1,169,000. Construction of a warehouse at Elmendorf AFB, Alaska. Engineer Dist., Anchorage, Alaska.

—Bell Helicopter Co., Fort Worth, Tex. $1,900,000. Work on a composite aircraft program. Fort Worth. Army Aviation Materiel Laboratories, Fort Eustis, Va.

—Lockheed California Co., Burbank, Calif. $1,900,000. Work on a composite aircraft program. Burbank. Army Aviation Materiel Laboratories, Fort Eustis, Va.

27—American Machine & Foundry Co., Brooklyn, N.Y. $2,382,574. Metal parts for 750-lb bombs. Garden City, N.Y. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Morrison-Knudsen Co., New York, N.Y. $1,645,000. Rehabilitation and construction of loading, assembling and packing facilities at the Iowa Army Ammunition plant, Burlington, Iowa. Engineer Dist., Omaha, Neb.

28—Continental Motors, Muskegon, Mich. $3,550,000. Unit exchange of a minimum quantity of new or remanufactured 0-470 engines. Mobile, Ala. Army Aviation Materiel Command, St. Louis, Mo.

—Western Electric, New York, N.Y. $3,200,000. FY 1967 Nike Hercules and Improved Nike Hercules engineering services. Burlington, N.C.; Santa Monica, Calif., and Syracuse, N.Y. Army Missile Command, Redstone Arsenal, Huntsville, Ala.

—Chamberlain Mfg. Corp., Waterloo, Iowa. $2,380,019. 106mm projectiles. Waterloo. Procurement Detachment, Chicago, Ill.

—Dyson & Co., Pensacola, Fla. $1,693,125. Alterations and air conditioning of 41 separate one-story frame airmen dormitories. Tyndall AFB, Fla. Office of the Chief of Engineers, Washington, D.C.

29—Davey Compressor Co., Kent, Ohio. $2,244,623. Self contained shop sets for maintenance of construction and automotive type equipment. Kent. Army Mobility Equipment Command, St. Louis, Mo.

—Westinghouse Air Brake Co., Peoria, Ill. $2,068,354. Road graders. Indianapolis, Ind. Army Mobility Equipment Command, St. Louis, Mo.

—Studebaker Corp., Minneapolis, Minn. $1,258,632. Generator sets. Minneapolis, Minn. Army Mobility Equipment Command, St. Louis, Mo.

—Allis-Chalmers Mfg. Co., Milwaukee, Wis. $10,911,625. Loaders. Deerfield, Ill. Army Mobility Equipment Command, St. Louis, Mo.

—Koehring Co., Newton, Iowa. $2,650,349. Ditching machines. Newton. Army Mobility Equipment Command, St. Louis, Mo.

—Caterpillar Tractor Co., Peoria, Ill. $7,941,917. Tractors. Peoria. Army Mobility Equipment Command, St. Louis, Mo.

—FMC Corp., South Charleston, W. Va. $2,219,140. Differential assemblies for M113 vehicles. San Jose, Calif. Army Tank Automotive Command, Warren, Mich.

—General Motors, Cleveland, Ohio. $6,500,000. Establishment of facilities to produce metal parts for 81mm shells. Cleveland. Ammunition Procurement & Supply Agency, Joliet, Ill.

—AVCO Corp., Stratford, Conn. $1,546,776. T-55-L-7C aircraft engines for CH-47 Chinook aircraft. Stratford. Army Aviation Materiel Command, St. Louis, Mo.

—Raytheon Co., Lexington, Mass. $1,791,979. Panel meter test sets for the Hawk missile system. Lexington, Mass., and Mountain View, Calif. Army Missile Command, Redstone Arsenal, Huntsville, Ala.

—URS Corp., Burlingame, Calif. $1,154,741. Development of an Automatic Data Processing System dealing with software for the Seventh Army, Germany. Engineer Research & Development Labs, Fort Belvoir, Va.

—Defco Construction Co., Tucson, Ariz. $1,130,000. Construction of two three-story, 200-man dormitories at Davis-Monthon AFB, Ariz.; and one three-story, 200-man dormitory at Williams AFB, Ariz. Engineer Dist., Los Angeles, Calif.

30—McKenzie Construction Co., San Antonio, Tex. $1,069,126. Work on the San Antonio Channel Improvement, Texas Project. Engineer Dist., Fort Worth, Tex.

—R. P. Burris Co., La Canada, Calif. $1,021,588. Work on the Blanchard Canyon and Channel and Debris Basin, Blue Gum Canyon Project. Tujunga, Calif. Engineer Dist., Los Angeles, Calif.

—Electro-Mechanical Corp., Sayre, Pa. $1,032,900. Electrical equipment shelters. Sayre. Army Electronics Command, Philadelphia, Pa.

—Norris Industries, Los Angeles, Calif. $1,816,785. 105mm cartridge cases. Vernon, Calif. Southwest Procurement Dist., Pasadena, Calif.

—Cadillac Gage Co., Warren, Mich. $1,394,793. Armored cars. Warren, Mich. Army Tank Automotive Command, Warren, Mich.

—General Motors, Indianapolis, Ind. $1,077,002. Steering gear assemblies and two lots of spare parts for XM733 amphibious assault vehicles and XM759 marginal terrain vehicles. Cleveland, Ohio. Army Tank Automotive Command, Warren, Mich.

31—Chrysler Corp., Huntsville, Ala. $1,285,426. Installation kits and shelters for field communications. Huntsville. Army Electronics Command, Philadelphia, Pa.

—Philco-Ford Corp., Newport Beach, Calif. $1,935,170. Test equipment for the Chaparral Missile System. Anaheim, Calif. Army Missile Command, Redstone Arsenal, Huntsville, Ala.

—Litton Systems, Inc., Van Nuys, Calif. $1,242,702. Conduct of an experiment to collect data on high speed aircraft against Army ground weapons. Fort Ord, Calif. Northwest Procurement Detachment, Oakland, Calif.

—General Electric, Burlington, Vt. $1,427,495. 7.62mm aircraft machine guns with ancillary equipment and repair parts to support Air Force and Army guns. Burlington. Army Weapons Command, Redstone Arsenal, Huntsville, Ala.

—Hol-Gar Mfg. Corp., Trimos, Pa. $2,703,546. 60-cycle diesel engine driven generator sets. Trimos. Army Mobility Equipment Command, St. Louis, Mo.

—Outboard Marine Corp., Waukegan, Ill. $1,456,428. Outboard motors for assault boats and rafts. Waukegan. Army Mobility Equipment Command, St. Louis, Mo.

—Dinger Contracting Co., Staten Island,

N.Y. $1,275,888. Construction of ammunition maintenance facilities at Letterkenny Army Depot, Chambersburg, Pa. Engineer Dist., Baltimore, Md.

—Packard Bell Electronics Corp., Newbury Park, Calif. $3,267,201. A special electronic test set used for air fields and aircraft carrier decks. Newbury Park. Southwest Procurement Detachment, Pasadena, Calif.

—S. S. Mullen, Inc., Seattle, Wash. $3,-949,631. Work on the Little Goose Lock and Dam on Snake River, Washington Project. Whitman County Wash. Engineer Dist., Walla Walla, Wash.

—Raytheon Co., Lexington, Mass. $1,734,-936. Magnatron tubes for Nike Hercules missiles. Waltham, Mass. Army Missile Command, Redstone Arsenal, Huntsville, Ala.

—Amron Corp., Waukesha, Wis. $1,569,578. Metal parts for bomblets. Waukesha. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Eureka Williams Co., Bloomington, Ill. $2,592,317. Bomb fuzes. Bloomington. Ammuntion Procurement & Supply Agency, Joliet, Ill.

—Wilkinson Mfg. Co., Fort Calhoun, Neb. $1,229,440. 60mm fin assemblies. Fort Calhoun. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Honeywell, Inc., Hopkins, Minn. $1,571,-450. Fuzes. $1,520,694. Metal parts for bomblets. New Brighton, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Chamberlain Corp., Waterloo, Iowa. $2,-812,622. High explosive warheads for 2.75-inch rockets. Waterloo. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Holston Defense Corp., Kingsport, Tenn. $1,672,544. Miscellaneous propellants and explosives. Kingsport. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Mason & Hanger, Silas Mason Co., New York, N.Y. $5,463,674. Loading, assembling and packing of explosives and for operations and maintenance activities at the Army Ammunition Plant, Burlington, Iowa. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Harvey Aluminum Sales, Torrance, Calif. $4,852,422. Classified ammunition and for operations and maintenance activities at the Army Ammunition Plant, Milan, Tenn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Raytheon Co., Bristol, Tenn. $2,166,480. 750-lb. bomb components. Bristol. Ammunition Procurement & Supply Agency, Joliet, Ill.

—International Harvester Co., Melrose Park, Ill. $1,146,640. Diesel engine driven tractors. Chicago, Ill. Army Mobility Equipment Command, St. Louis, Mo.

—Raytheon Co., Lexington, Mass. $1,635,-200. Bomb fuzes. Bristol, Tenn. Army Procurement Detachment, Chicago, Ill.

—Johnson Corp., Bellevue, Ohio. $5,295,448. ½-ton chassis. Bellevue. Army Tank Automotive Command, Warren, Mich.

—General Motors, Indianapolis, Ind. $2,-232,297. 12-month component improvement program for T-63-A-5A turbo shaft engines for OH-6A helicopters. $2,473,-200. T-63-A-5A engines for LOH Aircraft, Indianapolis. Army Aviation Materiel Command, St. Louis, Mo.

—Bell Helicopter Co., Fort Worth, Tex. $1,046,160. Drive shaft assemblies. $3,-687,826. Main hub assemblies. $2,300,986. Cylinder assemblies. Fort Worth. Army Aviation Materiel Command, St Louis, Mo.

—United Aircraft, Windsor Lock, Conn. $1,682,119. Propeller assemblies for U-1A and OV-1 aircraft. Windsor Lock. Army Aviation Materiel Command, St. Louis, Mo.

—AVCO Corp., Stratford, Conn. $1,689,640. Exhaust diffusers for T-53 engines. Stratford. Army Avialtion Materiel Command, St. Louis, Mo.

—Raytheon Co., Lexington, Mass. $1,000,-000. Work on the improved Hawk missile. Bedford, Mass. Army Missile Command, Andover, Mass.

—Memcor, Inc., Huntington, Ind. $6,406,-774. Receivers and transmissions for vehicle communication sets. Huntington. Army Electronics Command, Philadelphia, Pa.

—General Motors, Indianapolis, Ind. $4,-460,194. Transfer assemblies and transmissions for 155mm guns, eight-inch howitzers, and recovery vehicles. $1,211,-740. Transmission for personnel, cargo, and Hawk missile carriers. Indianapolis. Army Tank Automotive Center, St. Louis, Mo.

NAVY

1—University of Washington, Applied Physics Laboratory, Seattle, Wash. $2,769,000. Research and development in the field of underwater ordnance. Seattle. Naval Ordnance Systems Command.

—Hazeltine Corp., Little Neck, N.Y. $1,-212,713. Acoustic detection transmitting sets. Little Neck. Naval Air Systems Command.

—Raytheon Co., Sudbury, Mass. $1,000,000. Alteration kits for Polaris guidance electronic assemblies. Sudbury. Special Projects Office.

2—General Dynamics, Pomona, Calif. $3,-874,000. Materials and assemblies for the Standard Arm missile. Pomona. Naval Air Systems Command.

—United Boatbuilders, Bellingham, Wash. $2,526,262. Personnel landing craft vehicles. Bellingham. Naval Ship Systems Command.

—Cameron Iron Works, Houston, Tex. $1,-278,626. Inert parts for the MK12 MOD 1 Terrier missile booster. Houston. Naval Ordnance Systems Command.

3—McDonnell Aircraft, St. Louis, Mo. $36,-000,000. F-4J aircraft. St. Louis. Naval Air Systems Command.

6—United Aircraft, Stratford, Conn. $1,677,-300. Research and development connected with a mine countermeasures configuration of the CH-53A helicopter. Stratford. Naval Air Systems Command.

—Beech Aircraft, Wichita, Kan. $1,230,353. Aerial targets. Wichita. Naval Air Systems Command.

—Marinette Marine Corp., Marinette, Wis. $2,322,120. Mechanized landing craft. Marinette. Naval Ship Systems Command.

—Vitro Corp. of America, Silver Spring, Md. $9,394,200. Engineering and supporting services and facilities for Terrier, Tartar and Talos weapons systems. Silver Spring. Naval Ordnance Systems Command.

7—Melpar, Inc., Falls Church, Va. $2,865,-013. Airborne radar homing and warning sets. Falls Church. Naval Air Systems Command.

—Kaiser Aerospace & Electronics Corp., Palo Alto, Calif. $1,147,600. Spare parts to support the AN/AVA-1 data display system installed in A/6A aircraft. Palo Alto. Navy Aviation Supply Office, Philadelphia, Pa.

—American Electric, Inc., La Mirada, Calif. $1,515,064. 300-gallon external auxiliary fuel tanks. La Mirada. Naval Air Systems Command.

—Sperry Rand Corp., Great Neck, N.Y. $2,960,000. Increased limitation of authorization for Terrier MK 76 Mods 3 and 5 fire control system modernization. Great Neck. Naval Ordnance Systems Command.

8—Todd Shipyard, San Pedro, Calif. $1,600,-000. Regular overhaul of the landing ship, dock, USS Alamo (LSD-33). San Pedro. Supervisor of Shipbuilding, Twelfth Naval Dist., San Francisco, Calif.

—Raytheon Co., Sudbury, Mass. $1,221,000. Polaris MK-2 guidance electronics assemblies. Waltham, Mass. Special Projects Office.

—United Aircraft, Norwalk, Conn. $9,996,-645. A-6A aircraft. Norwalk. Aviation Supply Office, Philadelphia, Pa.

—M. Rosenblatt & Son, Inc., New York, N.Y. $1,042,460. Engineering and design services to modernize DLG-6 guided missile frigates. U. S. Naval Shipyard, Philadelphia, Pa.

—Bendix Corp., Mishawaka, Ind. $2,500,-000. Engineering program on the Talos RIM-8 series missile. Mishawaka. Naval Ordnance Systems Command.

—Collins Radio Co., Cedar Rapids, Iowa. $1,038,656. ARN/ARC-51 radio sets used for general communications purposes on airplanes, ships and vehicles. Cedar Rapids. Aviation Supply Office, Philadelphia, Pa.

9—Aerojet-General Corp., Sacramento, Calif. $1,180,720. Polaris A-3 propellant component. Sacramento. Special Projects Office.

—General Electric, Pittsfield, Mass. $2,097,-289. Poseidon guidance equipment. Pittsfield. Special Projects Office.

10—General Electric, Schenectady, N.Y. $3,-359,500. Research and development work pertaining to nuclear propulsion. Schenectady. Naval Ship Systems Command.

—Newport News Shipbuilding & Dry Dock Co., Newport News, Va. $1,287,513. Nuclear reactor compartment components. Newport News. Naval Ship Systems Command.

13—Magnavox Co., Fort Wayne, Ind. $3,800,-000. Increased limitations of authorization for basic engineering and development of an air droppable sonobuoy system. Fort Wayne. Naval Air Systems Command.

—Bethlehem Steel Corp., Hoboken, N.J. $1,307,777. Overhaul of the ammunition ship USS Mauna Loa (AE-8). Hoboken. Supervisor of Shipbuilding, Third Naval Dist.

14—United Aircraft, Stratford, Conn. $6,-927,117. HH-3F helicopters for the Coast Guard. Stratford. Naval Air Systems Command.

—Keltec Industries, Inc., Alexandria, Va. $1,640,298. Radar simulators and engineering services and technical training on the equipment. Alexandria. Naval Ship Systems Command.

15—Raytheon Co., Lexington, Mass. $1,000,-000. Long lead items for Sparrow III guided missiles. Lowell, Mass. Naval Air Systems Command.

—Thiokol Chemical Corp., Denville, N.J. $5,459,163. Liquid propellant rocket engines. Rockaway, N.Y. Naval Air Systems Command.

16—General Dynamics, Groton, Conn. $5,-000,000. Long lead time components for a nuclear-powered submarine. Groton. Naval Ship Systems Command.

17—Tabet Mfg. Co., Norfolk, Va. $1,316,031. Radio receiver switchboards. Norfolk. Naval Electronic Supply Office, Great Lakes, Ill.

20—Galion Amco, Inc., Galion, Ohio. $1,314,-747. 20mm projectiles. Galion. Navy Ships Parts Control Center, Mechanicsburg, Pa.

21—Jordon Co., Suisun City, Calif. $2,173,000. Improvements at Dry Dock No. 1, U.S. Naval Shipyard, Vallejo, Calif. Western Div., Naval Facilities Engineering Command, San Bruno, Calif.

—Grumman Aircraft Engineering Corp., Bethpage, N.Y. $8,200,000. Research and development work on the EA-6B aircraft. Bethpage. Naval Air Systems Command.

22—Marinette Marine Corp., Marinette, Wis. $7,258,400. 48 landing craft (mechanized). Marinette. Naval Ship Systems Command.

—Stanford University, Palo Alto, Calif. $4,800,000. Research work. Palo Alto. Office of Naval Research.

—Atlas-Bradford Co., Houston, Tex. $5,-566,496. Mark 45 projectiles. Houston. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—George Washington University, Washington, D.C. $1,032,000. Research on logistics planning. Washington, D.C. Office of Naval Research.

23—Williamette Iron & Steel Co., Portland, Ore. $1,298,295. Modification of the USNS General H. H. Arnold (T-AGM-9). Portland. Supervisor of Shipbuilding, Eighth Naval Dist., New Orleans, La.

—Lear Siegler, Grand Rapids, Mich. $3,-067,571. Loft bomb computer systems. Grand Rapids. Naval Air Systems Command.

—Norton Mfg. Co., Muskegon Heights, Mich. $1,187,030. Numerically controlled propeller profiling machine to machine ship propellers. Muskegon Heights. Navy Purchasing Office, Washington, D.C.

—Varo, Inc., Garland, Tex. $2,512,012. Guided missile launchers. Garland. Naval Air Systems Command.

24—Martin Marietta, Middle River, Md. $1,-017,031. Classified work on Navy aircraft. Middle River. Naval Air Systems, Command.

27—Sperry Rand Corp., Bristol, Tenn. $2,-044,469. Special tooling and special test equipment for the Shrike missile. Bristol. Naval Air Systems Command.

—General Electric, Utica, N.Y. $2,300,000. Airborne data processing systems. Utica. Naval Air Systems Command.

—Sanders Associates, Inc., Nashua, N.H. $5,272,621. Electronic equipment. Nashua. Naval Air Systems Command.

—Johns Hopkins University, Applied Physics Laboratory, Silver Spring, Md. $23,-294,000. Increase in the current research and development on Bumblebee for the Navy, Air Force, and NASA. Silver Spring. Naval Ordnance Systems Command.

28—General Precision, Riverdale, Md. $2,446,-500. Production of a prototype S2E weapon system trainer with related serv-

ices and materials. Riverdale. Naval Training Device Center, Orlando, Fla.
—B-E-C-K—Raber Inc., Seattle, Wash. $1,967,700. Construction of an Arctic Research Laboratory, Barrow, Alaska. Northwest Div., Naval Facilities Engineering Command, Seattle, Wash.
—Brezina Construction Co., Pomona, Calif. $1,343,000. Construction of barracks, waves' barracks and commissioned officers' mess (closed) at the Naval Station, Long Beach, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif.
—American Construction Co., Washington, D.C. $1,424,000. Addition to Air Force Systems Command Headquarters, Building 1535, Andrews AFB, Md. Chesapeake Div., Naval Facilities Engineering Command, Washington, D.C.
29—LTV, Inc., Warren, Mich. $6,305,537. Design, evaluation and demonstration at sea of an engineering model of the Lance landing force support weapon. Warren. Navy Purchasing Office, Los Angeles, Calif.
—Sealed Service, Inc., Elizabeth, N.J. $70,000,000. Containership service from West Coast ports to Vietnam. Military Sea Transportation Service.
30—Republic Electronics Industries Corp., Huntington, N.Y. $3,034,825. Radio navigational sets for aircraft. Huntington. Navy Aviation Supply Office, Philadelphia, Pa.
—Whiting-Turner Contracting Co., Memphis, Tenn. $1,598,000. Construction of an avionics training building at the Naval Air Station, Memphis, Tenn. Southeast Div., Naval Facilities Engineering Command, Charleston, S.C.
—General Dynamics, Pomona, Calif. $120,651,191. Production of the Standard missile. Pomona. Naval Ordnance Systems Command.
31—Teletype Corp., Skokie, Ill. $4,542,446. Various types of communication sets. Skokie. Navy Purchasing Office, Washington, D.C.
—Pasco Steel Corp., Pomona, Calif. $3,881,808. Pontoon assemblies. Columbus, Ga. and Pomona. Navy Purchasing Office, Los Angeles, Calif.
—Intercontinental Mfg. Co., Garland, Tex. $9,120,000 500-lb. bomb bodies. Garland. Navy Ships Parts Control Center, Mechanicsburg, Pa.
—Newport News Shipbuilding & Drydocking Co., Newport News, Va. $40,000,000. Advance planning scheduling, engineering and design work, material procurement and prefabrication for preparation for construction of nuclear-powered attack aircraft carrier CVA(N) 68. Newport News. Naval Ship Systems Command.
—North American Aviation, Anaheim, Calif. $1,510,506. Modification of ships inertial navigation system equipment on the nuclear powered submarine USS Lafayette (SSBN-616). Anaheim. Naval Ship Systems Command.

MARINE CORPS

9—Goodyear Tire & Rubber Co., Akron, Ohio. $3,787,350. Manufacture of 58, 60,000-gallon capacity, tactical airfield fuel dispensing systems. Akron. Headquarters, Marine Corps.
29—General Motors, Hudson, Ohio. $2,397,228. Scoop-type loaders and associated equipment. Cleveland, Ohio. Headquarters, Marine Corps.
31—FMC Corp., San Jose, Calif. $2,500,000. Modernization of 74 LVTH-6 vehicles to the LVTH-6A1 configuration. San Jose. Headquarters, Marine Corps.

AIR FORCE

1—General Electric, Cincinnati, Ohio. $40,822,784. Production of J 79-10 aircraft engines. Evendale, Ohio. Aeronautcial Systems Div., (AFSC), Wright-Patterson AFB, Ohio.
2—General Electric, Cincinnati, Ohio. $44,849,854. Production of J-79-15 and J-75-17 aircraft engines. Evendale, Ohio. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.
3—Cessna Aircraft, Wichita, Kan. $2,700,264. Production of spare parts for light observation aircraft. Wichita. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.
—General Motors, Milwaukee, Wis. $1,482,829. Overhaul and modification of missile gyroscopes. Milwaukee. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.
—Honeywell, Inc., Hopkins, Minn. $8,400,000. Production of bomb fuzes and related equipment. Hopkins. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.
—Bendix Corp., Baltimore, Md. $1,169,076. Production of airborne communications equipment. Baltimore. Warner-Robins Air Materiel Area, (AFLC), Robins AFB, Ga.
—TRW, Inc., Cleveland, Ohio. $1,327,679. Designing, fabricating and testing a prototype miltitube boiler and condenser system. Cleveland. Systems Engineering Group, Research and Technology Div., (AFSC), Wright-Patterson AFB, Ohio.
6—B. F. Goodrich Co., Akron, Ohio. $1,862,691. C-130 and C-133 aircraft tires. Akron. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.
—General Tire & Rubber Co., Akron, Ohio. $1,251,486. C-130 and C-133 aircraft tires. Akron. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.
7—Hallicrafters Co., Chicago, Ill. $1,210,200. Airborne electronic countermeasure systems. Chicago. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.
—Boeing Co., Seattle, Wash. $2,000,000. Assembly, installation and checkout of Minuteman missiles for the Grand Forks, N.D., AFB complex. Ballistic Systems Div., (AFSC), Norton AFB, Calif.
8—Hughes Aircraft, Culver City, Calif. $1,325,200. Production of test equipment for the Falcon air-to-air missile. Culver City. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.
—Northrop Corp., Hawthorne, Calif. $1,670,029. Production of spare parts and ground equipment for F-5 aircraft. Hawthorne. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.
—Philco Corp., Palo Alto, Calif. $7,621,000. Work on a communications satellite program for the United Kingdom. Palo Alto. Space Systems Div., (AFSC), Los Angeles, Calif.
9—Motorola, Scottsdale, Ariz. $3,660,000. Bomb fuzes. Scottsdale. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.
—Bendix Corp., Baltimore, Md. $1,891,000. Modification and improvement of the AN/FPS-85 space track radar. Towson, Md., and Eglin AFB, Fla. Rome Air Development Center, Griffiss AFB, N.Y.
—AVCO Corp., New York, N.Y. $15,683,000. Design, development, test and production of penetration aids. Stratford, Conn. and Wilmington, Mass. Ballistic Systems Div., (AFSC), Norton AFB, Calif.
—Honeywell, Inc., Hopkins, Minn. $2,095,590. Production equipment for aircraft ordnance. St. Louis Park, Minn. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.
10—General Dynamics, San Diego, Calif. $2,190,000. 23 Atlas missiles to be used in a re-entry vehicle development program. San Diego. Ballistics Systems Div., (AFSC), Norton AFB, Calif.
13—General Electric, Philadelphia, Pa. $1,500,000. Re-entry vehicle flight testing. Philadelphia. Ballistics Systems Div., (AFSC), Norton AFB, Calif.
—Douglas Aircraft, Long Beach, Calif. $3,214,904. Production of aircraft ordnance ejector racks. Torrance, Calif. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.
14—Honeywell, Inc., Hopkins, Minn. $9,047,500. Production of land mines and associated equipment. Hopkins. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.
—Goodyear Aerospace Corp., Akron, Ohio. $4,488,000. Air cargo handling pallets. Akron. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.
—Boeing Co., Seattle, Wash. $1,147,000. Production of missiles and related equipment for the sixth Minuteman wing. Seattle. Ballistics Systems Div., (AFSC), Norton AFB, Calif.
15—L. T. Industries, Inc., Dallas, Tex. $4,547,063. Production of aircraft bomblet dispensers. Garland, Tex. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.
—General Electric, Philadelphia, Pa. $1,800,000. Work on the Mark-12 re-entry vehicle program. Philadelphia. Ballistics Systems Div., (AFSC), Norton AFB, Calif.
—General Motors, Indianapolis, Ind. $3,424,000. Production of T-56 turboprop engines and related equipment. Indianapolis. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.
16—Wentworth Institute, Boston, Mass. $1,088,989. Research in rocket payload instrumentation. Boston. Electronics Systems Div., (AFSC), L. G. Hanscom Field, Mass.
17—General Motors, Milwaukee, Wis. $9,657,300. Work on the inertial guidance system for the Titan III space booster. Milwaukee. Space Systems Div., (AFSC), Los Angeles, Calif.
20—General Electric, Cincinnati, Ohio. $1,500,000. Development work on a Vertical/Short Take-off (V/STOL) aircraft program. Evendale, Ohio. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.
21—Lockheed Aircraft, Marietta, Ga. $38,957,500. Production of C-130 aircraft. Marietta. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.
—Martin-Marietta, Denver, Colo. $22,884,616. Work on the Titan III space booster. Denver. Space Systems Div., (AFSC), Los Angeles, Calif.
—General Dynamics, San Diego, Calif. $1,500,000. Work on Atlas/Agena space boosters. San Diego. Space Systems Div., (AFSC), Los Angeles, Calif.
23—General Electric, West Lynn, Mass. $2,687,380. Production of spare parts for J-85 engines. West Lynn. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.
—Boeing Co., Wichita, Kan. $3,168,380. Modification kits for electronic equipment on B-52 aircraft. Wichita. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.
—I.B.M., Gaithersburg, Md. $2,900,000. Engineering research and development on improved computer programming techniques. Omaha, Neb. Rome Air Development Center, (AFSC), Griffiss AFB, N.Y.
—McDonnell Co., St. Louis, Mo. $1,582,000. Production of modification kits, spare parts and related data for F-4 aircraft. Robertson, Mo. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.
27—Philco-Ford Corp., Philadelphia, Pa. $2,090,150. Production of components for the Sidewinder air-to-air missile. Philadelphia. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.
28—General Electric, West Lynn, Mass. $3,940,357. Development work on T58-14 helicopter engines. West Lynn. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.
30—North Electric Co., Galion, Ohio. $1,500,000. Prototype telephone control office. Galion. Electronics Systems Div., (AFSC), L. G. Hanscom Field, Mass.
31—Whittaker Corp., Chatsworth, Calif. $2,400,000. Procurement of electronic equipment. Chatsworth. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

Army To Phase Out Chickasaw, Shawnee

A plan for phasing out all of the Army's CH-21 Shawnee and all but two of its UH-19 Chickasaw helicopters by May 1968 has been approved by Army Chief of Staff.

The planned phase out results from the helicopters having passed their normal life expectancy. They no longer meet operational requirments and are costly to repair and operate.

There are 143 Chickasaws in inventory. All of these are assigned to the continental United States. The two remaining after the planned phase-out will continue to support Nike-X tests on Kwajalein Atoll.

More than half the 146 Shawnees in inventory are assigned to major commands.

OFFICE OF THE SECRETARY OF DEFENSE
WASHINGTON, D. C. 20301

OFFICIAL BUSINESS

POSTAGE AND FEES PAID

First Switching Center Outside Mainland United States Accepted

The first Defense Communications System Automatic Electronic Switching Center (AESC) outside mainland United States, located at Wahaiwa, Hawaii, was formally accepted by the Navy for the Defense Communications Agency on April 3.

The Hawaii center is part of the Automatic Digital Network (AUTODIN) planned as a world-wide network to accept, relay and deliver data, teletypewriter and computer communications between various types and combinations of transmitting and receiving equipment. The AUTODIN system supports DOD communications needs in the areas of supply, inventory control, personnel, finance, budget, operations, intelligence and medical.

Eight other AUTODIN switches will be installed in the Pacific area and three centers are planned for Europe.

Operated by the Navy, the Hawaii center is a part of the continental United States AUTODIN system which now has eight centers located at McClellan AFB and Norton AFB, Calif.; Tinker AFB, Okla.; Gentile AFS, Ohio; Andrews AFB, Md.; Hancock Field, Syracuse, N.Y.; Albany, Ga.; and Ft. Detrick, Md.

AUTODIN is a high speed, computer controlled, common user, secure data system. It is comprised of the AESC and a variety of subscriber terminals to meet specific requirements of perforated tape, machine cards and magnetic tape.

The two types of switching services provided at the AESC's are message switching (MSU) and circuit switching (CSU). The MSU processes traffic using a store and forward feature. It is used to accommodate high traffic volume and to expedite the flow of high traffic volume and to expedite the flow of high precedence messages. The CSU provides automatic direct switching of single address messages between identical tributary terminal equipment served by a switching center. It also has a capacity to introduce traffic into the mesage switching service.

Prime contractor for AUTODIN work and service in the United States is Western Union Telegraph Co. with the Radio Corp. of America as manufacturer of major equipment. The Philco Corp. is prime contractor for switching centers overseas.

AUTODIN and its complementary net, Automatic Voice Network (AUTOVON), are the result of a DOD decision in 1963 to modernize its Defense Communications System to provide automatic switching systems for voice, teletypewriter and data communications.

Navy Labs Merge To Form Ship R&D Center

The Navy Marine Engineering Laboratory, Annapolis, Md., and the David Taylor Model Basin, Carderock, Md., have been consolidated to form the Naval Ship Research and Development Center. The consolidation became effective March 31, 1967.

Merging of the two activities will provide the Navy a single research and development center with the capabilities and expertise to work on ship structural and propulsion concepts on a total ship basis.

The commanding officer and director of the center is Captain Manuel da Costa Vincent, USN, who will operate from the center headquarters at Carderock, Md. The Annapolis Division will be headed by Commander J. D. Evans, USN, as officer-in-charge.

Dr. Alan Powell is the technical director of the new center. He will be assisted by the following associate technical directors: Mr. H. V. Nutt, Marine Engineering Laboratory; Dr. William Cummins, Hydromechanics Laboratory; Commander Thomas Lechner, USN, Aerodynamics Laboratory; Dr. William Murray, Structural Mechanics Laboratory; Mr. Gene Gleissner, Applied Mathematics Laboratory; and Mr. Westley Curtis (Acting), Acoustics and Vibrations Laboratory.

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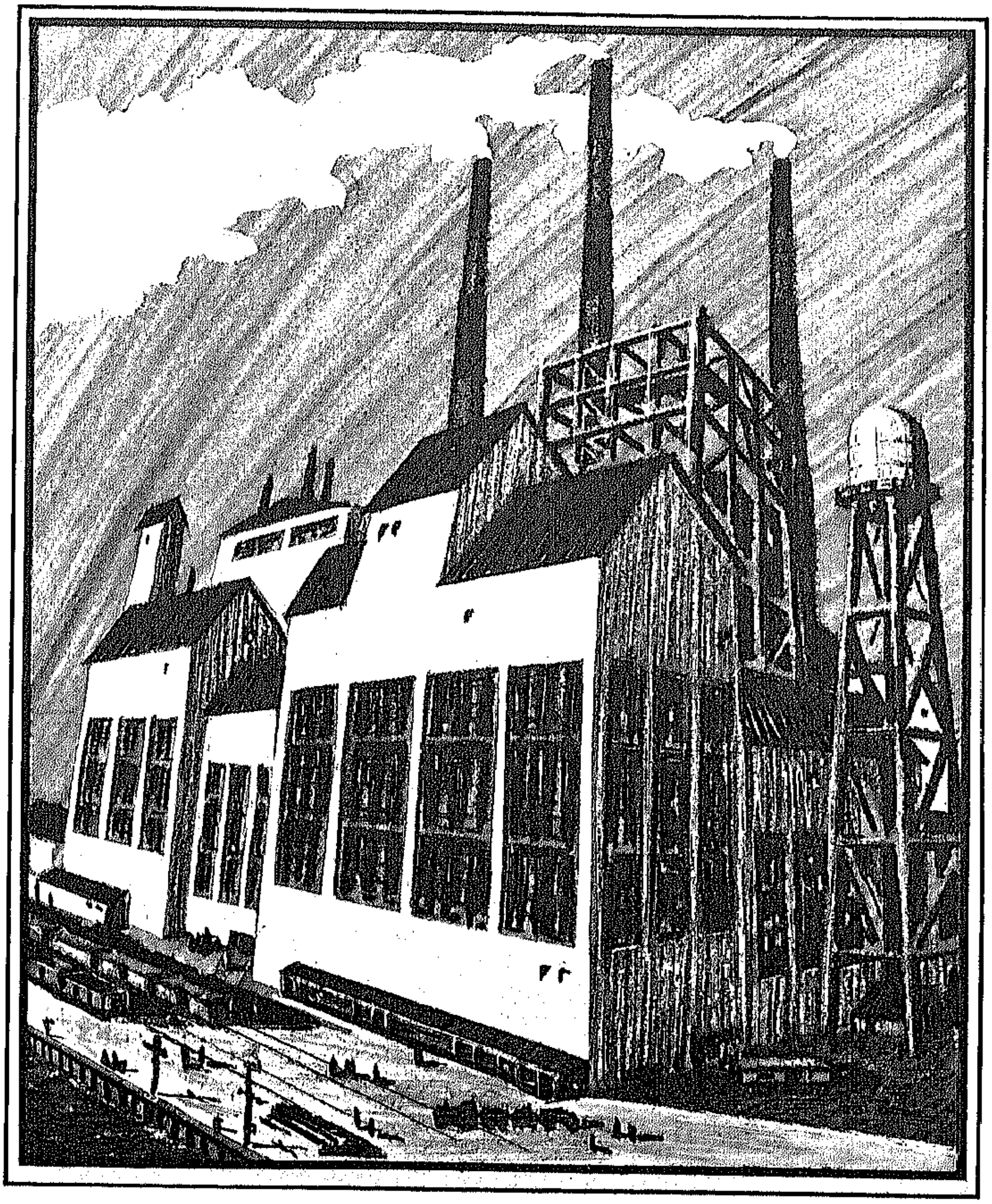
DEFENSE INDUSTRY BULLETIN

VOL. 3 NO. 5 MAY 1967



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DEFENSE INDUSTRY

BULLETIN

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The *Defense Industry Bulletin* is published monthly by the Business & Labor Division, Directorate for Community Relations, Office of the Assistant Secretary of Defense (Public Affairs). Use of funds for printing this publication was approved by the Director of the Bureau of the Budget.

The purpose of the *Bulletin* is to serve as a means of communication between the Department of Defense (DOD) and its authorized agencies and defense contractors and other business interests. It will serve as a guide to industry concerning official policies, programs and projects, and will seek to stimulate thought by members of the defense-industry team in solving the problems that may arise in fulfilling the requirements of the DOD.

Material in the *Bulletin* is selected to supply pertinent unclassified data of interest to the business community. Suggestions from industry representatives for topics to be covered in future issues should be forwarded to the Business & Labor Division.

The *Bulletin* is distributed without charge each month to representatives of industry and to agencies of the Department of Defense, Army, Navy and Air Force. Requests for copies should be addressed to the Business & Labor Division, OASD(PA), Room 2E813, The Pentagon, Washington, D.C. 20301, telephone, (202) OXford 5-2709.

The Light Observation Helicopter Avionics Purchase Viewed as a Total Package Procurement

Harry J. Rockafeller
John P. Duffy

The Total Package Procurement Concept (TPPC), an innovation in DOD procurement policy, was widely publicized when it was applied to the Air Force C-5A program. In approximately the same time frame, the U.S. Army Electronics Command (ECOM) was procuring the Light Observation Helicopter Avionics Package (LOHAP) using basically the same procurement technique. This article will examine the LOHAP purchase in terms of TPPC.

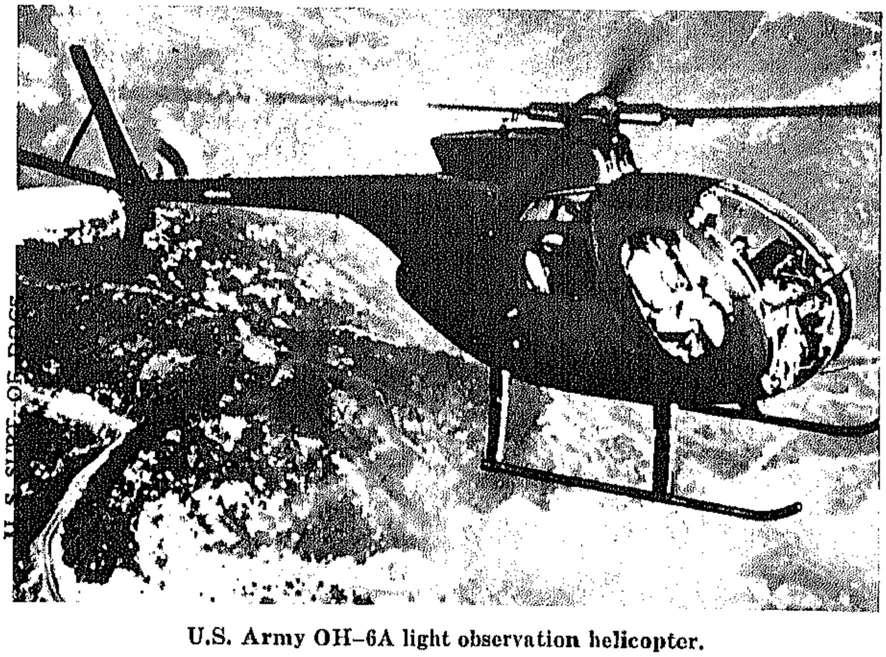
TPPC contemplates the procurement of an item or system in a competitive environment under a contract that provides the maximum definable amount of development, production and support. A shortened version of TPPC could be "contracting for as much as can be defined and competitively priced."

Prior to the total package approach, defense procurement had generally been accomplished by fragmentation of development and acquisition. This fragmentation consisted of successive contracts for development, initial production, follow-on production, and support. Fragmented procurement was usually characterized by inadequate competition for the initial and some of the follow-on production effort. The exigencies of the situation often led to placement of the initial and follow-on production with the developer. In many instances the developer sought to "buy in" on the development and "get well" on the subsequent production. The developer, seeking to enter the program, tended to underestimate costs and optimize technical achievement. This faulty projection of costs and technical achievement often had an adverse effect on Government funding and planning for equipment availability to the field.

The fragmented process has been described as "iceberg" procurement. In buying this iceberg, the Government could see the small portion of the iceberg that was visible above the water. This portion was the development contract with its projection of technical achievement and costs. The balance of the iceberg, which included the long range cost and technical implications of production and support, was not visible. In such situations the Government was locked into a long range program with limited overall visibility.

This kind of situation formed the background for development of TPPC —ideally, the development and acquisition of an item or system under a contract that provides firm commitments for cost, delivery and performance, including the period of operational use. Such a contract would provide the proper inducements to a subcontractor to design and develop economical equipment that would fit the intended need. It would also provide the Government with greater visibility over an entire program and, by centralizing responsibility, would reduce Government-contractor interface.

Under this concept the Government competes and awards a contract providing for as much of the development, production and support as can be defined. In recognition of the extended period to which a contractor is committed to a firm price, provi-



U.S. Army OH-6A light observation helicopter.

Harry J. Rockafeller is Asst. Chief, Contract Operations, Procurement and Production Directorate, Army Electronics Command, Fort Monmouth, N.J. He has been with Electronics Command since 1952. He is a graduate of Rutgers University and is Vice President of the Fort Monmouth Chapter, Army Aviation Association of America.

sions are made for cost escalation. Total system responsibility is placed on the prime contractor, thus acting to reduce Government-contractor interface and emphasize prime contractor responsibility. Change-inhibiting clauses are used to combat the cost and schedule impact of excessive engineering changes and, finally, the quantity purchased represents the best estimate of total defense needs for that item. Obviously, the extent to which the contract quantities reflect total requirements bears directly on the successful application of the con-

Secretarial authority to negotiate, direction was given to change the development procurement to development/production. This Secretarial direction cited the principal reason as being the desire to obtain competition for the first production quantity. It also recommended the use of a fixed-price or fixed-price incentive fee contract and provision for incremental funding.

An interesting feature of the direction was the mandate that the award be made on the basis of the "best overall" proposal and not on price alone. This reflected the combination of development and production. Normally, production contracts were awarded on price, and development contracts on technical excellence. This dictate to award to the best overall proposal produced an amalgam of the criteria for the award of the two previously separated features, development and production.

The LOHAP procurement was practically concurrent with the C-5A and, during the LOHAP processing, there was little mention of total package procurement per se. In retrospect, it appears that the incorporation of certain additional TPPC features in LOHAP, such as the escalation provisions and the change-inhibiting clauses, could have been considered.

By contracting simultaneously for development and production, the Government was able to obtain the price and other advantages offered by competitive total package procurement. In addition, maintenance considerations were incorporated in the development phase so the contractor was forced to design with maintenance as well as producibility in mind.

John P. Duffy is Technical Manager for the Light Observation Helicopter Avionics Package (LOHAP) at the Army Electronics Command, Fort Monmouth, N.J. Mr. Duffy has been with the Electronics Command since 1958. He is a graduate of Villanova University and is a member of the Army Aviation Association of America.

After extensive evaluations and negotiations with all six offerors, a contract was awarded to Sylvania Electronic Systems, Division of Sylvania Electric Products, Inc., Buffalo, N.Y.

Award to Sylvania in the target amount of $16,100,000 was based on its submission of the best overall proposal, combining the highest degree of technical merit and the lowest price. During the negotiation phase the intense competition for this award was evidenced by large scale price revisions.

Subsequent to award, the procurement was reviewed by the Logistics

ment activity his production programming and engineering effort to:

- Establish required automatic assembly facilities.
- Develop new manufacturing methods and processes.
- Establish requirements and controls for use of similar components and assemblies in design and production.
- Establish production fabrication design specifications for use by the design and production engineering activity.
- Schedule facilities for a smooth transition of actions.
- Provide for early introduction of manufacturing personnel into the equipment-build activity.

This early scheduling of the preproduction activities provides the contractor with many additional technical problems to overcome early in the program. However, it tends to focus the contractor's sights and attentions on the ultimate goals of the program, the production of a quality, producible product rather than the development of handcrafted non-reproducible equipment.

The contractor is required to employ sound basic engineering practices and to maximize basic design creativity and initiative to effect a producible and cost effective design to meet the customer's requirement in a specified time period. The sound engineering and design creativity demonstrated in the LOHAP program are depicted in Figures 1 and 2 below.

- Figure 1 shows a typical digital divide by N circuit used in the radio transceivers. Shown above the printed circuit (p.c.) card is a specially designed divide by 10 integrated circuit which will functionally replace the encircled area shown on the p.c. board. This change is expected to reduce production costs on the order of $1,000,000, reduce the overall production complexity of the equipment design, and improve the inherent design reliability and maintainability of the equipment.
- Figure 2 shows the audio amplifier card used in the three radio transceivers. The contractor selected this design approach initially after examining the trade-offs in the use of thick film circuit technology and rejected thick film circuitry as a result of higher costs. His continued examination of this area developed that the thick film approach now offers a competitive cost advantage for use not only in this audio amplifier, but also in the second I. F. amplifier card. It is anticipated that the introduction of these changes will improve the inherent equipment reliability and maintainability, and reduce the weight of the equipment.

The contractor obtains the additional benefit of leverage in this type procurement in dealing with his subcontractors and component suppliers. This becomes an invaluable asset for him in achieving the rigid state-of-the-art design requirements imposed on the program. Achievement of these requirements is invariably dependent on the rapid transition of prototype devices to reliable production forms, or the special tailoring of devices for use in the system or particular equipment. As an example, the contractor has a requirement to procure about 15,000 high power UHF transistors for use in the AN/ARC-116 transceiver production equipment. This respectable order for such a device has generated substantial vendor interest. In addition it has focused the component technology activities, within Government and industry, on the rapid introduction of a device which will replace the present transistor, and will substantially reduce the required number of power transistors for this equipment.

The contract is now 14 months old and the contractor is nearing the end of the development phase. Several discussions on the total package aspects have been held with Walter Serniuk, the Sylvania project manager for LOHAP. He commented that the total package forces the contractor to look at the total job from the outset, and it encourages creativity to simplify design and achieve economies. He believes that it encourages better planning by the contractor for long term application of his facilities and resources.

Long range evaluation of TPPC and its LOHAP application are required to produce meaningful determinations. However, even at this early stage, the LOHAP procurement is considered additional proof that

(*Continued on page 20*)

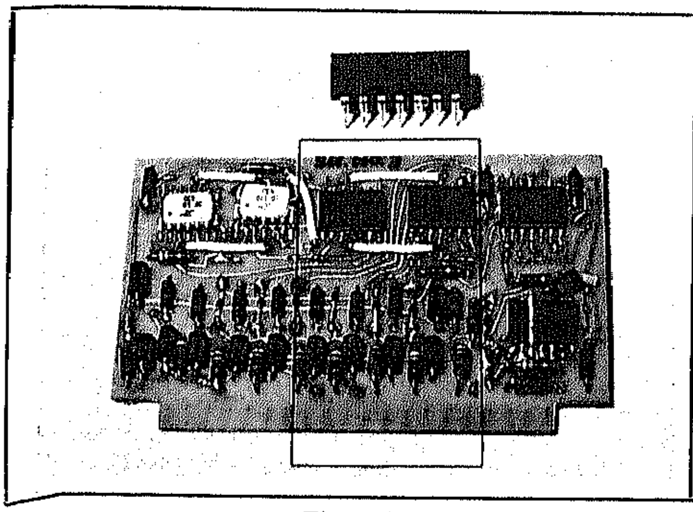


Figure 1
Digital Divide by N—P. C. Card

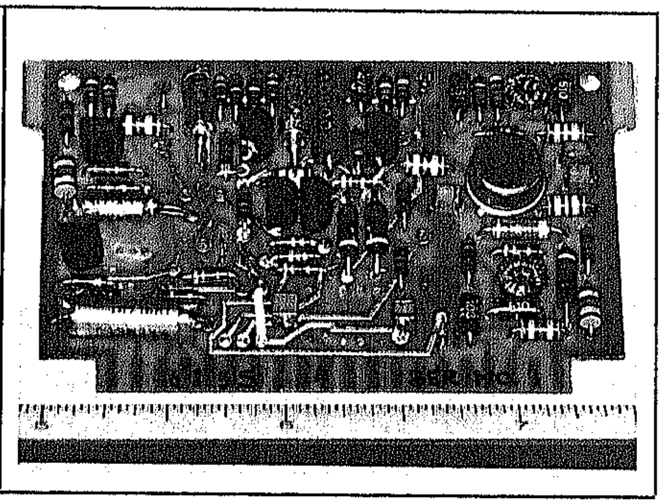


Figure 2
Audio Amplifier P. C. Card

Cooperative Logistics in Italy

Peter E. Feigl

The term "cooperative logistics" is a broad, all-encompassing term which, among others, includes supply support, procurement assistance, maintenance support, storage, contract administration, training, and joint research, development and production programs.

The supply support aspect of cooperative logistics is a key element in the Defense Department's Foreign Military Sales Program. It is normally embodied in a government-to-government arrangement executed at the Defense Minister or Military Department level. Under such an arrangement, the foreign government "invests" and, in return, participates in one or several of the logistic systems of the U.S. Military Departments. The U.S. Military Department, having a given weapon system in its inventory, is responsible for furnishing to the foreign purchaser of the same system the necessary follow-on logistic support which will assure satisfactory operational maintenance support, standardization and utilization of the weapon system.

Previous issues of the *Defense Industry Bulletin* have carried articles, which illustrated the diverse aspects of cooperative logistics between the United States and Germany, the United Kingdom and Canada ("U.S.-German Cooperation Includes Field of Logistics," December 1966; "U.S.-U.K. Logistics Cooperation," March 1967; and "U.S.-Canadian Logistics Cooperation," April 1967.)

In the case of Italy, as with other countries, the concept of cooperative logistics was an outgrowth of the Military Assistance Program (MAP) of the 1950's. As MAP was phased out, the need for follow-on spares and for maintenance of the equipment furnished to Italy under that program was met first through random sales against requisitions. This random approach next led to a more systematic provisioning and stocking of spare parts, the cooperative logistics or supply support arrangement.

The next logical evolutionary step was the procurement of additional or attrition end items for those already in the inventory. Finally, satisfied with the quality and performance of U.S. military equipment, Italy began to look to the United States to meet its present requirements either through purchase of U.S. equipment, adapting U.S. equipment to its own special needs, or coproducing the equipment under license from the U.S. manufacturer. Among the weapon systems and major end items covered under cooperative logistics or support arrangements in Italy are: the M-113 armored personnel carrier; M-55, M-107 and M-109 self-propelled artillery; the M-60A1 tank; the F-104G tactical strike and F-104S all-weather interceptor aircraft; the S-2A aircraft; and Nike and Hawk ground-to-air missile systems.

Cooperative logistics in the fullest sense was achieved with the more recent Italian decision to coproduce M-60A1 tanks, M-113 armored personnel carriers, and F-104S aircraft in Italy. Thus the Italian capacity to coproduce M-113's (over 2,000 to date), which are fully interchangeable with the U.S.-produced version, provides the United States and its NATO allies with an alternate supply source in Europe.

A detailed examination of the Italian M-113 coproduction program will illustrate the value of this and similar programs to the participating governments.

The first fully assembled vehicle was delivered by Italian industry to the Italian Army in less than a year. This feat was remarkable despite the fact that the vehicle was completely assembled from U.S.-manufactured parts and components. Among the many complex operations which preceded the first assembly were license negotiations between manufacturers, procurement actions, dissemination and translation of technical data, tooling up and plant layout, training of technicians and workers, and establishment of the assembly line—all of which had to be done on a more or less concurrent basis. The fa
this was accomplished in such
time is a tribute to the comp
operation between the U.S. a
ian project managers and th
and Italian firms involved in th
ect.

The M-113 coproduction
was based on an "umbrella" g
ment-to-government agreement
- Specified what was to be
aged and outlined the responsi
of the parties to the agreem
- Established decision levels f
settlement of disputes and direct
munications channels.
- Provided legal protection f
prietary rights, patents and ro
(in this instance those of th
Food and Chemical Machinery C
- Fixed the parameters of th
gram with respect to third co
- Placed restrictions on the c
dissemination of technical data.
- Fixed responsibilities for c
of the manufactured item (c
control of changes and modific
thus ensuring standardizatio
component interchangeability).
- Outlined other important a
such as services to be rendered b
U.S. Military Department co
(in this instance the Departm
the Army), and the method of
bursement for such services.

This basic agreement made
the development of implem
agreements (industry-to-industry
industry-to-government).

A qualified resident staff of
experts, reporting to the U.S. p
manager, was established in Italy
site to solve day-to-day tech
problems as they arose, thus ke
slowdowns in production to an a
lute minimum. The availability
such a staff was of tremendous b
fit to the Italian coproducers, O
Melara of La Spezia (the prime
tractor) and FIAT of Turin.

It was found that, since the
production program involved ful
imbursement for all U.S. ser
rendered either by U.S. Governm
personnel or by the U.S. licens

onsiderable amount of direct contact had to be maintained between the decision-making bodies on both sides.

Adequate provisions also had to be made at the onset to insure standardization of components, emergency supply sources, and responsibility for the performance of the end item. Failure to do so could have caused serious difficulties due to the difference in U.S. and Italian law.

Finally, by the establishment of adequate systems for the preparation and channeling of reports, the administration of the M-113 coproduction program was greatly enhanced.

A similar arrangement has been established for the M-60A1 tank coproduction program. The Italian capability to coproduce M-60A1 tanks obviously will include a spare parts capability as well. This program has been initiated only recently with an initial run for 200 units to be coproduced in Italy. These will supplement 00 M-60A1 tanks which were purchased earlier by Italy from the United States.

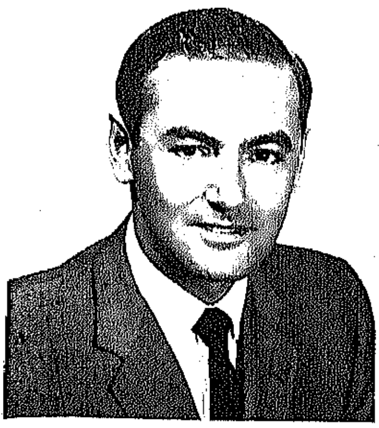
The F-104S aircraft coproduction program will require considerable cooperative logistics in its initial stages. With a $400 million program involving 165 aircraft, it can be anticipated that Italian industry will eventually manufacture most of its spares under license. Under this project the Italian prime contractor, FIAT Aviation, will spend some $26 million with U.S. manufacturers (primarily Lockheed and General Electric) for joint research, development and test work which will ensure that Italian industry shares in the technological spin-off to be executed from such work.

Other Italian coproduction programs now pending or under consideration cover the M-109 self-propelled howitzer, Naval Tactical Data Systems (NTDS) units, and SH-3H and CH-47 helicopters.

It can be readily seen that cooperative logistics contribute to the longevity of original equipment while, at the same time, fostering standardization of equipment and providing alternate sources of supply, both of which are essential for any military alliance. Additionally, it can become an important element in promoting the concept of a defense common market. Whenever the work and cost of research and development, testing, tooling up and production can be shared on a free competitive basis, the result will be a stronger alliance by providing the participants with the best weapon system at the lowest cost to the taxpayer. Finally, during the last four or five years, cooperative logistics has helped offset about half of U.S. defense expenditures incurred through the deployment of U.S. forces in NATO countries. In Italy, coproduction programs, both on a government-to-government and industry-to-industry basis, are much in favor and likely to gain in importance. These programs and the concept of cooperative logistics have further strengthened the ties between the U.S. and Italian Armed Forces and between the industries of both countries.

In conclusion cooperative logistics is beneficial to the participants by fostering:

- Standardization of military equipment essential for joint military operations.
- Joint acceptance of strategic and tactical concepts and military doctrine based on the use of common military equipment and munitions.
- Creation of ground, air and naval environments compatible with U.S.-operated equipment.
- Creation of complementary forces from diverse nations.
- Establishment of alternate supply sources.
- Promotion of the defense common market concept.
- Providing industry with the technology it needs to remain competitive in the armaments field as well as the civil sector of the economy.



ter E. Feigl is Dep. for Management in the Office of the Dep. Asst. retary of Defense, International urity Affairs (International Logis- Negotiations). He serves as a mber of the Military Exports Subcommittee of the Defense Industry visory Council. Before entering ernment service in 1964, Mr. gl was Director of International rations for Kaman Aircraft Corp.

Industrial Security Management Course Sessions Scheduled

The Defense Department has scheduled a series of 10 sessions of the Industrial Security Management Course during FY 1968. Purpose of the course is to achieve a common level of understanding, interpretation and application of DOD regulations and directives.

The course is open to security officials of industry who are responsible for the safeguarding of classified information in the custody of contractors participating in the DOD Industrial Security Program. A security clearance of Confidential or higher is required for all enrollees. Company Confidential is acceptable.

Industrial and research organizations interested in sending representatives to the course should inform their cognizant security office and submit the names, addresses, levels of security clearances, and preferred date of attendance.

Reservations will be made on a "first come, first served" basis. Those for whom reservations are made in advance will receive invitations from the Commandant, U.S. Army Intelligence School, about a month prior to the starting date of the session they have selected to attend.

DOD offers this instruction without charge. However, industrial organizations must bear the cost of transportation of representatives to and from the city where the course is held and their maintenance while attending the course.

Following are the locations and dates of the sessions:

Fort Holabird, Md: July 24-28, 1967; Aug. 21-25, 1967; Dec. 11-15, 1967; Jan. 8-12, 1968; March 18-22, 1968; April 8-12, 1968.

Boston, Mass.: Sept. 25-29, 1967.

Chicago, Ill.: Oct. 2-6, 1967.

Denver, Colo.: May 6-10, 1968.

Los Angeles, Calif.: May 13-17, 1968.

Know this man?

Perhaps you don't. But it's a fair bet that employees of the Martin-Marietta Corporation of Orlando, Fla., do. For this man—a member of our Armed Forces in Vietnam—is a close relative of someone on the Martin-Marietta team.

By highlighting the personal interest employees share in each other's sons, brothers and husbands serving in Vietnam—and their mutual desire to turn out the best possible product for their fighting men—Martin-Marietta, a top supplier of weapon systems for the Defense Department, has come up with an unusual way to promote its Zero Defects program.

To provide personal motivation, the company displays posters throughout the plant featuring photographs of servicemen (all relatives of company employees) now serving in Vietnam. The photos are mounted under the caption, "Know this man?" and accompanied by a short explanation of who the man is, where his father, mother, brother, or wife works, and where he is stationed.

At the bottom of each poster is the punch line—the key to the idea's success: "He's just one of the people who depend every day on you and ZERO DEFECTS."

The "Know this man?" campaign started almost by accident. An employee brought in a photo of his son, who is fighting in Vietnam, and asked if it would make a good feature story for the company publication.

The story ran and, as a follow-up, a request for information on any other sons in service was issued. The idea was to do a feature on a number of employee's sons.

The photo-feature and call for additional photos brought an overwhelming response. When space in the company paper ran out, the photos were reproduced in quantity and mounted on large posters and the program was launched.

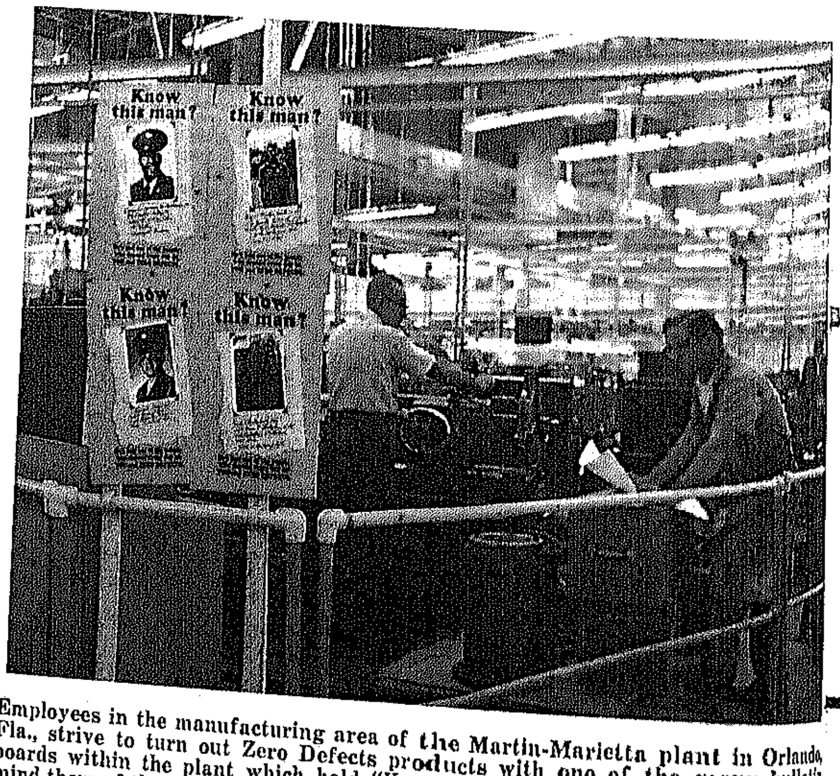
Now posters are displayed throughout the Orlando plant, and one is specifically placed in the work area of the employee whose relative is featured.

Although the Zero Defects quality improvement program has been in effect since it was originated by Martin Marietta in July 1962, the current poster series has given new meaning to an old concept.

Almost every area of the corporation's huge defense plant has an employee with one or more sons in service. The prominent display of the son's photograph, showing him in uniform—many in combat dress—has had an inspiring effect.

"I had no idea you had a son in Vietnam," is a comment heard many times in the plant. And with the comment comes a renewed dedication to produce the best possible equipment and weapons for all sons in service.

In this plant of 9,000 employees when someone talks about a quality product, he means it.



Employees in the manufacturing area of the Martin-Marietta plant in Orlando, Fla., strive to turn out Zero Defects products with one of the many bulletin boards within the plant which hold "Know this man?" posters nearby to remind them of their responsibility.

World-wide U.S. Aircraft Inventory FY 1966-1967

The Defense Department has compiled what is believed to be the most comprehensive figures on the U.S. World-wide aircraft inventory ever released to the public.

The inventory summarizes all gains and reductions, both actual and projected, for FY 1966–1967. It includes Army, Navy, Air Force and Marine Corps aircraft, fixed wing and helicopter, in active, reserve and inactive categories.

Reflected in the inventory are actual aircraft losses in Southeast Asia from July 1, 1965, to Feb. 28, 1967, and projected losses in Southeast Asia for the period March 1, 1967, to June 30, 1967. For all aircraft other than those involved in Southeast Asia, the tables reflect actual gains and reductions from July 1, 1965, to Jan. 31, 1967, and projected figures for the period Feb. 1, 1967, to June 30, 1967.

Aircraft listed in the "New Production" column of the tables reflect all new aircraft production, including a small number of research, development, test and evaluation aircraft.

Older aircraft, which are no longer considered part of the combat force but are still in the active inventory, are not listed in their original categories but are carried in "Other Fixed Wing" or "Trainers" column.

The tables also reflect aircraft conversions. For example, F-101's converted to the RF-101 (reconnaissance) configurations are reflected as conversion reductions from the "Tactical Fighter and Attack" category and as conversion gains in the "Reconnaissance" category.

The "Other" column under both gains and reductions includes all transfers to or from the Military Assistance Program (MAP) and between Services. This category also includes gains from reclamation or salvage and reductions due to retirements.

The current inventory differs from previous tables on aircraft losses and deliveries as follows:

- All aircraft in the U.S. inventory, including aircraft in storage, are carried in the current figures, accounting for some 33,000 to 35,000 aircraft.
- In addition to combat and operational losses due to all causes, the tables show reductions due to retirements, conversions, and those aircraft lost to one Service when they have been transferred to another Service. Also included are aircraft transferred from the U.S. inventory to the MAP program.
- The deliveries listed in the past included only new production, conversions and aircraft reworked after removal from storage. Present gain figures indicate new production and conversions, transfers into a Service inventory from the MAP program and aircraft transferred from one Service to another—thus noted as "gained" by the receiving Service. The new tables, however, do not count as "gains" aircraft reworked after removal from storage. (Such aircraft are already in the inventory totals.)
- More of the FY 1968 figures are "actual" and fewer are "projected."

Table 1

Department of Defense Aircraft Inventory

Category	June 30 1965 Active Forces	Reserve Forces[a]	Inactive[b]	Total	June 30 1967 Active Forces	Reserve Forces[a]	Inactive[b]	Total
Tactical Fighter and Attack	4,758	900	603	6,261	5,205	856	183	6,244
Interceptor Fighter	1,246	408	8	1,662	1,008	407	76	1,491
Reconnaissance	554	190	148	892	769	223	132	1,124
Heavy/Medium Bomber	1,107	----	622	1,729	747	----	898	1,645
Transports	3,010	1,033	223	4,266	2,606	953	282	3,841
Trainers	4,748	232	1,100	6,080	4,936	218	1,088	6,242
Other Fixed Wing	4,753	916	602	6,271	4,720	761	480	5,961
Total Fixed Wing	20,176	3,679	3,306	27,161	19,991	3,418	3,139	26,548
Helicopters	5,380	433	410	6,223	8,174	572	597	9,343
DEPARTMENT OF DEFENSE	25,556	4,112	3,716	33,384	28,165	3,990	3,736	35,891

[a] Includes all aircraft in the Air Force and Army Reserves, Air Force and Army National Guard, and operating aircraft only in the Navy and Marine Corps Reserves.
[b] Includes reserve stocks, aircraft on bailment and loan, and aircraft awaiting disposition.

Table 2

Aircraft Inventory Gains and Losses
FY 1966–1967

Category	Inventory June 30 1965	GAINS Production, Conversion Transfers				REDUCTIONS Losses, Retirements, Conversions, Transfers						Inventory June 30 1967
						Southeast Asia		Non-Southeast Asia			Total	
		New Production [g]	Conversions [h]	Other [i]	Total	Hostile [j]	Operational [k]	Operational Losses [k]	Conversions [h]	Other [l]		
Tactical Fighter & Attack	6,261	1,464	97	110	1,671	746	184	374	114	[a] 270	1,688	6,244
Interceptor Ftr	1,662	---	---	---	---	7	2	53	1	[b] 108	171	1,491
Recce	892	288	109	13	410	79	11	52	----	36	178	1,124
Heavy-Medium Bomber	1,729	---	---	---	---	---	---	7	2	75	84	1,645
Transport	4,266	282	2	151	435	31	22	58	112	[c] 637	860	3,841
Trainers	6,080	611	---	163	774	---	---	176	80	[d] 356	612	6,242
Other Fixed Wing	6,271	375	261	377	1,013	132	93	156	160	[e] 782	1,323	5,961
Total Fixed Wing	27,161	3,020	469	814	4,303	995	312	876	469	2,264	4,916	26,548
Helicopters	6,223	4,393	3	64	4,460	363	333	280	3	361	1,340	9,343
TOTAL	33,384	7,413	472	878	8,763	1,358	645	1,156	472	[f] 2,625	6,256	35,891

[a] Consists of 126 retirements, including 88 F–86's; 74 MAP transfers, including 44 A–1's and 23 A–4's; 66 A–1's transferred between Services; and 4 transfers to schools and museums.

[b] Consists of 81 retirements including 77 F–89's; 24 F–89's transferred to other Services and 3 F–89's transferred to schools and museums.

[c] Consists of 410 retirements including 41 C–47's, 55 C/HC 54's, 138 C/KC 97's, and 135 C–119's; 84 Military Assistance Program (MAP) transfers including 33 C/HC–47's, 15 C/HC–54's, 13 C–119's, and 7 C–130's; 136 C–7A's (CV-2's) transferred from Army to Air Force; and 7 transfers to schools and museums.

[d] Consists of 146 retirements including 78 T–33's, 19 T–34's, and 30 TC–47's; 176 MAP transfers including 133 T-33's and 24 T–34's; and 34 T–33's transferred to schools and museums.

[e] Consists of 388 retirements including 122 O–1's, 75 F–6's, 51 F–3's, 27 F–1's, 25 AF–1's and 19 U–6's; 63 MAP transfers including 34 U–18's, 11 U–7's, 8 HU–16's and 6 S–2's; 326 transfers to other Services including 249 Army O-1's transferred to Air Force and 59 AF U–6's transferred to Army; and 5 transfers to schools and museums.

[f] Total other, non-flying losses consist of 521 inter-service transfers, 440 transfers to MAP and 1,664 retirements and transfers to schools and museums.

[g] Includes deliveries of Research Development Test and Engineering (RDT&E) aircraft, where applicable.

[h] Conversion gains and conversion losses between aircraft categories as a result of the modification of the aircraft involved.

[i] Transfers from other services, MAP, and gains from reclamation or salvage.

[j] Aircraft known or believed to have been lost due to hostile action.

[k] Losses due to flying and ground accidents.

[l] Transfers to other services, MAP, and reductions due to reclamation, retirements, and other non-operational causes.

Aircraft Inventory Gains and Losses
FY 1966

Category	Inventory June 30 1965	GAINS Production, Conversion, Transfers: New Production [a]	Conversions [b]	Other [c]	Total	REDUCTIONS Losses, Retirements, Conversions, Transfers: Southeast Asia Losses: Hostile [d]	Southeast Asia Losses: Operational [e]	Non-Southeast Asia: Operational Losses [e]	Non-Southeast Asia: Conversions [b]	Non-Southeast Asia: Other [f]	Total	Inventory June 30 1966
Tactical Fighter & Attack	6,261	522	49	78	649	302	84	185	42	242	855	6,055
Interceptor Ftr	1,662	---	---	---	---	4	---	27	1	80	112	1,550
Recce	892	155	39	7	201	30	5	25	---	19	79	1,014
Heavy/Medium Bomber	1,729	---	---	---	---	---	---	3	1	36	40	1,689
Transports	4,266	143	1	6	150	14	15	27	65	286	407	4,009
Trainers	6,080	247	---	25	272	---	---	83	36	196	315	6,037
Other Fixed Wing	6,271	153	140	185	478	54	41	77	84	351	607	6,142
Total Fixed Wing	27,161	1,220	229	301	1,750	404	145	427	229	1,210	2,415	26,496
Helicopters	6,223	1,857	3	19	1,879	152	133	119	3	174	581	7,521
TOTAL	33,384	3,077	232	320	3,629	556	278	546	232	1,384	2,996	34,017

[a] Includes deliveries of RDT&E aircraft, where applicable.
[b] Conversion gains and conversion losses between aircraft categories as a result of the modification of the aircraft involved.
[c] Transfers from other services, MAP, and gains from reclamation or salvage.
[d] Aircraft known or believed to have been lost due to hostile action.
[e] Losses due to flying and ground accidents.
[f] Transfers to other services, MAP, and reductions due to reclamation, retirements, and other non-operational causes.

Table 4

Aircraft Inventory Gains and Losses
FY 1967

Category	Inventory June 30 1966	GAINS Production, Conversion, Transfers: New Production [a]	Conversions [b]	Other [c]	Total	REDUCTIONS Losses, Retirements, Conversions, Transfers: Southeast Asia: Hostile [d]	Southeast Asia: Operational [e]	Non-Southeast Asia: Operational [e]	Non-Southeast Asia: Conversions [b]	Non-Southeast Asia: Other [f]	Total	Inventory June 30 1967
Tactical Fighter & Attack	6,055	942	48	32	1,022	444	100	189	72	28	833	6,244
Interceptor Ftr	1,550	---	---	---	---	3	2	26	---	28	59	1,491
Recce	1,014	133	70	6	209	49	6	27	---	17	99	1,124
Heavy/Medium Bomber	1,689	---	---	---	---	---	---	4	1	39	44	1,645
Transports	4,009	139	1	145	285	17	7	31	47	351	453	3,841
Trainers	6,037	364	---	138	502	---	---	93	44	160	297	6,242
Other Fixed Wing	6,142	222	121	192	535	78	52	79	76	431	716	5,961
Total Fixed Wing	26,496	1,800	240	513	2,553	591	167	449	240	1,054	2,501	26,548
Helicopters	7,521	2,536	---	45	2,581	211	200	161	---	187	759	9,343
TOTAL	34,017	4,336	240	558	5,134	802	367	610	240	1,241	3,260	35,891

[a] Includes deliveries and losses and retirements of RDT&E aircraft, where applicable.
[b] Conversion gains and conversion losses between aircraft categories as a result of the modification of the aircraft involved.
[c] Transfers from other services, MAP, and gains from reclamation or salvage.
[d] Aircraft known or believed to have been lost due to hostile action.
[e] Losses due to flying and ground accidents.
[f] Transfers to other services, MAP, and reductions due to reclamation, retirements, and other non-operational causes.

American Industry Takes Cost Reduction Seriously

THE WHITE HOUSE
WASHINGTON

February 11, 1967

This memorandum from Secretary McNamara tells how American industry is conserving Defense resources. I believe you will find it worth your time to read it.

Secretary McNamara states that 75 contractors reported cost reductions of $1.8 billion in two years on their Defense sales. This is a most gratifying response to my request that our Nation's Defense community help us reduce costs.

Three years ago, you asked major defense contractors to step up their efforts to reduce costs under defense contracts. At the same time, you asked me to take their cost reduction efforts into account when making future source selections and in determining profit and fee rates on noncompetitive negotiated contracts.

A recently completed analysis of progress under the Defense Contractor Cost Reduction Program shows that industry has responded vigor-

the first year of formalized reporting, totaled $811. Savings in FY 1966 totaled $996 million.

Benefits to Defense.

These savings benefit the Defense Department by:

- Reducing payments to contractors under cost-reimbursement contracts.
- Enabling the Defense Department to share in savings under contracts with incentive-type arrange-

of the TA-4E aircraft. The canopy was reengineered to reduce its thickness, eliminate an unnecessary electric heating element, and reduce the number of seams over the pilot's head from two to one.

Technical Data. Western Electric Co., Inc., recently reported the following savings:

- The preparation of composite parts' lists to utilize repetitive information formerly shown on separate

packing savings of $1,019,600 for the six-month period ending June 30, 1966.

• Modification of packaging specifications to allow use of material already on hand to pack M26 hand grenades and reuse of packing material in which M557 ammunition fuzes were received, instead of procuring additional material to meet the prior specifications, saved $676,024.

• Use of wood skids in lieu of pallets for 105mm cartridges saved $262,400.

Technical Manuals. Gyrodyne Company of America, Inc., reported a variety of actions which saved $81,200 in technical manual costs in FY 1966.

• Elimination of unnecessary symbols on wiring diagrams saved $2,063.

• Preparation of final copy directly from handwritten work eliminated a typed rough draft and saved $6,398.

• Combination of three publications into one saved $1,004.

Automatic Data Processing. Northrop Corporation reduced costs $350,468 by applying electronic data processing techniques to its purchase order, procurement management information, and materiel industrial and standards systems. Improved utilization of data processing reports permitted the corporation to reduce manpower requirements in one of its groups by more than 35 percent—saving an additonal $117,540.

Administration. The McDonnell Corporation saved $941,120 by a recent company-wide campaign against unnecessary paperwork. The drive eliminated 408 automated reports, over 1,200 report copies, 76 manual reports and 199 forms. In addition, 237 forms were standardized. Fifty-four tons of paper were disposed of by file cleaning alone.

Industry Response.

Today, defense industry is conscientiously participating in the Defense Contractor Cost Reduction Program. Most contractors consider it imperative to have a cost reduction program to remain competitive and realize fair profits. Many had programs long before the Defense Department program was started, but all seem to have intensified their efforts during the last three years.

Lockheed Aircraft Corporation is the largest defense contractor. Lockheed's Annual Report to Stockholders dated March 4, 1966, discussed its costs reduction program:

"All nine operating companies surpassed their goals in cost reduction. After realizing total savings of $117 million in 1964 in the first year of the intensified industry campaign sponsored by President Johnson and Defense Secretary McNamara, we knew that the enthusiasm of the initial push would be hard to sustain. Yet we bettered our 1964 performance with corporate-wide savings of $132 million, enabling us to strengthen our competitive position, pass along substantial savings to the U.S. Government and improve our profits. These savings come from a variety of techniques—process innovations, automation, computer aids, Zero Defects, value engineering, and more efficient work procedures."

Cost reduction techniques are being applied by companies to their civilian as well as their military work. A Wall Street Journal survey reported that these techniques are also being used by many firms not directly connected with the defense program. The Vice President for Purchasing of one of the major airlines (not a participant in the program) recently wrote us:

"Because of the widespread impact of your program, we are finding broader acceptance for our own cost reduction efforts. Other corporate purchasing departments, I am sure, are finding similar benefits from your program. The American consumer and taxpayer cannot help but benefit from this organized effort to reduce costs."

The Defense Contractor Cost Reduction Program has had the uncompromising support of the top executives in industry and the Defense Department. I am confident it will continue to receive such support.

Alphabetical Listing of Parent Companies Participating in Defense Contractor Cost Reduction Program

AAI Corp.
Aerojet General Corp.
American Air Filter Co., Inc.
ARO, Inc.
Atlantic Research Corp.
AVCO Corp.
Beech Aircraft Corp.
Bell Aerospace Corp.
The Bendix Corp.
The Boeing Co.
Burroughs Corp.
Collins Radio Co.
Communications Systems, Inc.
Computing and Software, Inc.
Control Data Corp.
Cornell Aeronautical Laboratory, Inc
Curtiss-Wright Corp.
Day and Zimmermann, Inc.
Douglas Aircraft Co., Inc.
Dynalectron Corp.
Electronic Communications, Inc.
Electro-Optical Systems, Inc.
FMC Corp.
The Garrett Corp.
General Dynamics Corp.
General Electric Co.
General Motors Corp.
General Precision, Inc.
Goodyear Aerospace Corp.
Grumman Aircraft Engineering Corp
Gyrodyne Co. of America, Inc.
Hayes International Corp.
Hercules, Inc.
Honeywell, Inc.
HRB-Singer, Inc.
Hughes Aircraft Co.
Hycon Mfg. Co.
IBM Corp.
International Harvester Co.
ITT Corp.
Interstate Electronics Corp.
Johns Hopkins University
Kaiser Jeep Corp.
Kaman Aircraft Corp.
Keltec Industries, Inc.
Lear Siegler, Inc.
LTV, Inc.
Litton Systems, Inc.
Lockheed Aircraft Corp.
Loral Corp.
Marquardt Corp.
Martin-Marietta Corp.
Massachusetts Institute of Technology
McDonnell Corp.
Melpar, Inc.
The MITRE Corp.
Newport News Shipbuilding and Dry Dock Co.
North American Aviation, Inc.
Northrop Corp.
Olin Mathieson Chemical Corp.
Page Aircraft Maintenance, Inc.
Pan American World Airways, Inc.
Philco-Ford Corp.
Radiation, Inc.
Radio Corp. of America
Raytheon Co.
Remington Arms Co., Inc.
Sperry Rand Corp.
Sylvania Electric Products, Inc.
Thiokol Chemical Corp.
TRW, Inc.
United Aircraft Corp.
Vitro Corp. of America
Western Electric Co., Inc.
Westinghouse Electric Corp.

FROM THE SPEAKERS ROSTRUM

Address by Hon. Robert N. Anthony, Asst. Secretary of Defense (Comptroller), to American Ordnance Assn., Washington, D. C., March 16, 1967.

Hon. Robert N. Anthony

The Paperwork Problem

Not many people like paperwork—or at least not many people will admit they like it. Since I am going to talk about some of our efforts to reduce the amount of paper that flows between contractors and the Defense Department, my remarks should theoretically be popular.

But—as is the case with many broad propositions—it is a fact that although most everyone favors reduction of paperwork in general, there is a great difference of opinion as to exactly what should be done as a practical matter. . . .

First, let me say that we do recognize that there is a problem—a serious problem. Over the years, each manager of a major weapon system project has tended to develop his own system for collecting data on plans, measuring and reporting progress against those plans, and recording actual experience. The result was proliferation—of systems, of reports and of acronyms. Fertile imaginations and active ingenuity accomplished tasks which were worth doing—and they got results. This proliferation is not good, and we know it is not good.

But having said this, I want also to point out that there is another side of the coin. Defense managers do need information. It is their responsibility to see to it that the best possible weapon systems get developed, that these systems be produced on time, and that the Government pays only a reasonable price for them. So we do need systems, and they must be carefully worked out systems, that will show the Government manager what is going on, where the trouble spots are, and do this accurately and promptly.

Managers in DOD—the Secretary of Defense, his principal assistants, the senior officials of the Military Departments and the Defense Agencies, the system managers—must represent the public interest. DOD management cannot duck its responsibility to guard national security and provide prudent stewardship of public resources, and we must provide the means.

In recent years, DOD has emphasized competitive procurement and incentive contracting, rather than sole source and cost plus fixed fee (CPFF). These changes have been tremendously helpful, but they do not, of course, automatically insure that quality, delivery time and costs are what they should be. We must continue to receive information that gives us the necessary visibility on these important questions.

We, therefore, will always need reports from contractors. But we believe that substantial improvements can be made in the nature of these reports, and this is the program on which we are now working.

At present we are concentrating on large programs. These efforts we call SAIMS—the Selected Acquisitions Information and Management System. SAIMS development has already resulted in the elimination of new requirements for the Defense Contractors Planning Reports (DCPR), the report of Costs Incurred on Contract (DD Form 1177), the Financial Management Report (DD Form 1097), and several other special forms peculiar to individual Services.

The development of SAIMS is taking place in three principal areas. The first, to provide an economic information system, is designed to meet the requirement for information about the activities of the work force of our major contractors which enables us to assess the impact of the Five Year Defense Program on industries and geographical areas. Some economic impact data have been collected in the past using the DCPR and a variety of other reports. The uniform, streamlined approach was begun in December 1965, and the current sample includes 422 plants. The data provide the basis for more responsive, more accurate answers to questions which reflect the concern of all branches of this Government for knowledge of the impact of the dollars which are spent in the national defense.

The second area deals with the problems of making cost estimates. Particularly where new systems are concerned, we have been handicapped by the lack of comparable cost data on previous programs for use as a basis of estimating the cost of the new program. We need such estimates in order to make rational choices among competing development alternatives, to estimate our funds requirements, and to use as a cross check against contractor estimates in the negotiation process.

We have developed a new system for collecting the data needed for such

It is called the Cost In-
Report (CIR). CIR pro-
niform means of collecting
costs for contracts which
of major weapon system
Cost analysis organizations
n the Military Departments
rocess, store and use CIR
data which are stored in
ata bank.

ta are not collected until
proval of the Office of Sec-
Defense is granted. Instead
ting system managers to
whatever information they
now require that all pro-
CIR data be reviewed and
by the Office of the Secre-
efense. To date, 24 of the
plans have been reviewed,
more expected during 1967.
lans were approved in a
orm—11 for aircraft sys-
five for missiles. One pro-
was turned down because
considered to be a reason-
rement, and seven are "in

of the CIR system was ap-
the Bureau of the Budget
66. At present, its coverage
to aircraft, missile and
ems. Our plans envision an
in the near future to ships,
ectronic systems and ar-
cles.

d part of the SAIMS effort
with the information that
by project managers and
evels of DOD management,
y can monitor the contrac-
rmance. Any such system
three aspects of perform-
ity, schedule and cost. A
ty of systems and reports
rpose has been developed
ars by various agencies in

ck on this problem is radi-
nt from that used hitherto.
prescribing a set of reports
for filling them out, and
hat the contractor set up a
t will produce the figures
e entered on these reports,
ng the opposite approach:
ur reporting requirements
contractor's own system,
n making him operate a
t to satisfy our require-
approach recognizes that
such thing as the one best
t, although two contrac-
ave different internal control systems, they may be equally good. If a system provides the information that a contractor needs to manage his own operations, it should also be able to provide the information needed by DOD managers.

Thus, rather than specifying the system, we shall specify the criteria which a constractor's system must satisfy, and stand ready to accept any system that meets these criteria.

The essence of the criteria is that the contractor should be able to identify, plan and authorize work and the estimated cost of this work; and measure actual costs incurred, the costs which should have been incurred, and the output of work accomplished. He could then evaluate performance against plan to assure that the plans are being followed or that deviations quickly come to light. The criteria call for the identification of the specific tasks required to accomplish the contract and the designation of responsible people who must exercise control. There must be planning of the resources which will be used, explicit scheduling of the work required, accounting for costs incurred, and explanations of the variance from plan.

Note the difference between specifying criteria and specifying a system. We will no longer say to a contractor: "You must use PERT." Instead, we will say, "You must have a system that meets certain criteria. Various versions of PERT meet these criteria. If you want to use PERT, or some part of PERT, fine. If you prefer some other system, that is all right with us, just so long as it meets the criteria that any good system should meet."

The data requirements of the Government will be met from the same pool of data which serves contractor management. Normally, our requirements will be for summary information from the contractor's own reports, since the detailed information will be available in the contractor's internal system if circumstances should require it. We must, of course, assure that the data will be available when needed and that the data we are provided are valid, timely and useful.

The development of this part of SAIMS has been under way for some time, with the active participation of Government (including National Aeronautics and Space Administration, Federal Aviation Agency and the Atomic Energy Commission) and industry (through the Council of Defense and Space Industry Associations). This summer we plan to issue implementing instructions for installing planning and control system requirements in large Government contracts. These instructions will contain:

- Criteria for the contractor's management control system.
- Procedures and standards for evaluating the contractor's proposed system during source selection.
- A list of maximum data requirements from which the Military Departments will select items they choose to require from contractors.
- Procedures to be followed in testing the operational performance of the contractor's system.

We have been encouraged by the progress made so far. To some we may seem slow but, as I said at the beginning, efforts of this kind are not easily accomplished. The criteria must be written in such a way that they do not unduly restrict contractors on the one hand, nor permit sloppy systems to slip through on the other. Every phrase has to be argued about by all the parties concerned. But the end is in sight, and the final product will, I think, be something that industry will like much better than what we have now.

Address by Gen. Howell M. Estes Jr., USAF, Commander, Military Airlift Command, at the National Symposium on Better Management Information and Reporting, National Archives and Records Service, Washington, D.C., Nov. 1, 1966.

Management Information Management

It has been said that often a good question is more important than a good answer.

The best answer in the world too often does not relate directly to the question that should have been asked. But the right question forces and focuses attention squarely where it belongs. This concept goes back at least as far as Socrates, whose teaching consisted of asking the right questions in a logical sequence. Today, the basis

of all problem solving is the matter of identifying the problem.

One pointed question that has come down through the centuries is from the poet Juvenal. "Who," he asked, "is going to guard the guards themselves?"

My primary question today is in a similar vein, namely: "Who is going to manage management information?" I think this is a good question; in fact, one of the vital questions of our time. Our hosts of the National Archives and Records Service, in the very act of convening this symposium, would seem to be asking precisely that sort of question. I am pleased and honored that they have asked me to be a part of this distinguished assemblage.

To assure you that I am necessarily sensitive to the problems of management in general, and particularly to those of management information, let me briefly state the three guises in which I appear before you. These are: a military commander, a Government manager, and a man with a business to run.

First, you see the commander of the Military Airlift Command (MAC), a major command of the U.S. Air Force. Our principal mission is to provide strategic, combat and specialized airlift services for all DOD elements and some other agencies of the Federal Government—up to and including the President. Our command—MAC—is also responsible for such other missions as Aerospace Rescue and Recovery; Air Weather; Aerospace Audio-Visual services, including combat photo document, aerial photo mapping, geodesy and gravimetry; and Aeromedical Evacuation, both inter-theater and domestic. These services are also performed for other agencies besides the Air Force.

Secondly, MAC is the operating agency through which the Secretary of the Air Force discharges his responsibility as DOD Single Manager for Airlift Services. As Executive Director of that agency, I am, therefore, a Government manager, in a somewhat broader context than the usual military commander.

Thirdly, what we call "common user airlift" is financed under an Air Force Industrial Fund. Thus a portion of my fiscal responsibility is more commercially oriented than is the case with most military commanders. This is why I say that I have a business to run.

The responsibilities outlined in that little thumbnail sketch help me to remain a very industrious student of management and management information.

In addition, the aeronautical arts and sciences are currently being revolutionized, and so we have on the horizon a genuine revolution in airlift. The foundation of this revolution is grounded upon such aircraft as today's jet cargo C–141 Starlifter, and tomorrow's giant C–5.

The true thrust of the revolution, however, will be found in wholly new concepts and methods of operating, and in completely new and radical ways of exploiting the great productivity, flexibility and responsiveness of these new aircraft. That revolution is never going to take place without a wholly new approach to management—to the information that each level of management is going to require.

Gen. Howell M. Estes, Jr., USAF

These two airplane types, by coincidence, also illustrate the dominant problem of this symposium.

The C–141 has a maximum structural payload capacity of 35 tons. Keep that figure—35 tons—in mind for a moment.

Next we come to the C–5; five contractors competed for the development and production contract—three for the airframe and two for the engine. In reply to the Air Force Request for Proposal (RFP), the five competitors sent in an aggregate of 240,000 pages —not counting any copies. Since 30 copies of each proposal were required, the total weight of the paper submitted was 35 tons—the maximum payload of today's C–141.

It took more than 400 Air Force experts five months to read and evaluate that mass of data. This, to me, hardly represents any tremendous progress in the management of management information.

One reason is that we didn't know exactly what question to ask— so we asked far too many in our RFP. After that exercise, we asked ourselves some very pertinent questions.

Were we not, for example, asking for too much detail on matters which should properly be the concern of the contractors? Why did we need 7,000 pages of cost data when this was a price competition and the contract was fixed-price-incentive? And were we not asking for too much detailed design, rather than simply specifying performance requirements and letting the winning competitor achieve them in his own way.

True, these questions were asked after the 35-ton fact. But they were asked and they are good questions, which should help us to manage management information a lot better next time we go out with an RFP.

I think we also have to acknowledge that all questions about management information are somewhat after the fact. We are already well into the age of information systems, quasi-systems, pseudo-systems, unrelated masses of computer hardware, and far too many types and classes of software. But our management of information has by no means improved to the same extent that the systems have multiplied.

If we seem to be drowning in a flood of information, our main hope may be illustrated by the story of the layman who witnessed the dedication of the 200-inch telescope at Mount Palomar in 1948. He sidled up to the Chief Astronomer and said:

"Modern astronomy sure makes man seem insignificant, doesn't it?"

"Yes," the scientist replied, "but don't you see—man is the astronomer."

Similarly, if we are drowning in information, it is a flood of our own making and, therefore, our own creature to control, manage and use for our own purposes. The word "purposes" hints at one solution for con-

the information explosion

trol—goal orientation—and I will address the significance of goals to management information a little later.

First, I would like to outline what I see as some of the basic problems; then, after a few words on goals, I will suggest what I feel is the framework for at least one approach to the answer.

The first problem, rather than being peculiar to management alone, is universal—the very fact of the information explosion. In science alone, the growth of knowledge has been astronomical. DaVinci could say, in the 15th century, that he was familiar with the entire body of scientific literature existing at that time. Even as late as the 19th century, Gauss had a full grasp of every branch of mathematics.

Today no scientist—and this includes 90 percent of all the scientists who ever lived—can hope to keep abreast of even a small percentage of the work published in his own sub-sub-branch of his particular discipline.

In fact, it has been estimated that it is cheaper to re-do a technical project—if the cost is less than $100,000—than to go through the process of trying to learn if someone has already solved the problem. Thus the question boils down not so much to one of too much information but of too much information that is too difficult or expensive to find.

The second problem arises from the rapid growth and the increasing complexity of the areas which have to be managed. The order of magnitude of effort I mentioned in managing the revolution in airlift is only a single example. Everyone in commerce, industry, engineering, science, the professions and Government feels the force with which the growth curves are pulling apart. The things we have to manage are growing geometrically, while our knowledge of how to manage seems to increase only arithmetically at best. Thus there is more to manage, and more information to manage it with, but "more plus more" seems to add up to less in the way of control.

Third, there is the constantly increasing speed with which decisions must be made. Instant communications over more and more channels, the speed of travel and distribution and the rapidity with which information is generated, all allow less and less time for reflection and deliberation. A transatlantic cable contains 75,000 tons of copper wire, while Telstar handles more channels of communication more effectively with less than a ton of materials. But there has been no matching order of improvement in man's ability to absorb all these additional inputs and come up with an instant output—a decision.

Fourth, the common information needs of managers have not really been clearly identified. There has been more emphasis on how information should be presented than on what information is required to begin with. This, too, is related to the question of goals which, as they set the limits of a playing field, can also delimit and contain the profusion of information, and determine what is "out of bounds."

Fifth, there is a great need for a vertical information structure with a common data base. Decision is essentially the apex of a pyramid built on a broad substructure of alerting, exploring and analyzing. Each level of the structure must have access to a common base of information—a data bank, if you will. To whatever extent a genéral purpose digital computer can quickly and accurately mechanize a great portion of the fundamental processes, to that extent will the manager be able to make better and more timely decisions.

But if the computer has in a sense solved some portion of this fifth problem—or any of the others—it has also spawned a sixth and perhaps most critical problem.

An old Danish proverb says that prediction is difficult, particularly when it pertains to the future. Thus, when the primitive ENIAC computer was built in 1946, the fact that the thing worked seemed to be a sufficient end unto itself. The mathematicians and engineers at once saw a means of solving what had once been impossibly long equations. But how many saw that ENIAC really was the rudimentary beginning of a potential revolution in the information sciences?

The first automobiles were called "horseless carriages" and that is precisely what they looked like, designed for tradition rather than function. In the same way, the first computers were seen as faster calculating machines or more copious filing systems. And so today, 20 years after ENIAC, we are, in effect, using third-generation computers for bookkeeping and filing.

The essence of the sixth problem is this: We are doing without electronic brains what the neurophysiologists and psychologists tell us we do with our human brains—utilizing them at a small percentage of their actual capacity. We look at a machine that can carry out fantastically rapid arithmetical and logical operations and fail to see an ingenious tool that can and must be usefully integrated into a full-spectrum management information system.

Dr. Alain Enthoven, Assistant Secretary of Defense (Systems Analysis), has said this:

". . . The systems analysis approach bears no essential relationship to computers at all. . . . This shouldn't be surprising, because the really difficult and important part of doing a good analysis is not the computation; it is formulating and defining the problem, clarifying the objectives, and determining which assumptions ought to be considered."

Although he was speaking specifically to systems analysis, I would think Dr. Enthoven's statement bears with equal validity upon the entire problem of management information systems. What he was addressing particularly was the necessity for setting goals.

In my own opinion, goals which are not in some way measurable are not true goals, since there is no way for us to know whether we have actually attained them or not, or how far short we may have fallen, or how to close the gap between what we meant to achieve and what we did accomplish.

For a single analogy, we might think of servomechanisms—machines for which man sets a goal and which then tend to regulate themselves in achieving and holding that goal with a fair amount of stability. Take, for example, a furnace thermostat and an aircraft autopilot.

In the one case, man sets the thermostat for a desired temperature and after that his house should remain within tolerable limits of that temperature. In the latter case, the human pilot feeds a desired set of directions into the automatic pilot, and the autopilot will then maintain the aircraft satisfactorily close to those parameters.

However, with the thermostat, you don't say to the gadget on the wall, "I'd like to remain warm and comfortable, so take care of it." What you do is set the pointer to a specific degree of temperature.

By the same token, you don't tell the autopilot that you'd like to get to Milwaukee in the least time at a safe altitude. Instead you set the dials for a specific compass heading, altitude and attitude, and the machine will keep you a few degrees to either side of these figures until either the gyros have drifted too much or you crank in a new set of numerical instructions.

In either case, the goals must be specified in definite quantitative terms or there is no way for the mechanism to know what you desire from it. The same is true of organizational goals.

But there is one fundamental difference. When the house gets warmer or colder than the selected temperature, the control mechanism opens or closes the circuit that turns the furnace off or on. When the autopilot senses that external forces are pushing the aircraft off the preselected path, it actuates servomotors to move the control surfaces and correct the discrepancy. Man, having once set the initial conditions, is out of the loop, and we have a closed-loop feedback system.

In an organization, on the other hand, the loop is open, with only the manager to complete the feedback circuit. The mechanism is not self-regulating. When goals are not being achieved, the manager must know it, he must know why, and he must know what corrective action to take. For all of these, he needs information.

In setting goals, then, we determine which things spell the difference between success and failure. Having done that, we have decided which things require the attention of management.

Thus management information which does not relate to purpose—usually expressed in goals—has little significance. So we might say that goals express purpose in terms of what or how much we expect to achieve in a given period of time.

Expressing goals quantitatively provides a language for relating actual results to these projected goals. So we need information for—at the very minimum—these three purposes: setting goals, scheduling events to achieve these goals, and measuring results against the goals. Then, if there is any divergence between achievements and goals, the manager needs further information to determine the reasons. He can then take corrective action, either to improve performance or, if necessary, to recast his goals in a more realistic mold.

Thus an organization is designed for a specific purpose or set of purposes, and managed in such a way as to achieve those purposes. To know what the purposes are, to know whether they are attainable, to organize for their attainment, to know whether they remain valid in the dynamism of changing situations, to know whether they are being achieved, and above all to know why or why not, for these management objectives we must have information.

Most of all, however, we need very good information on how much of what kind of information our particular purposes really demand.

All of this means to me that we must have a manager of management information.

Classically, the functions of management encompass planning, organizing, directing, coordinating and controlling. A case can be made for the thesis that each of the first four functions must be carried out with control in mind. But control is not an end in itself, nor can it be performed in a vacuum.

That, again, is why it is so essentiol to establish goals, because only in reference to goals does control have any meaning or any possibility of being achieved.

For our purposes today, we might concentrate on planning and controlling as the two most important functions of management. For simplicity's sake, we can define planning as the setting of goals, and controlling as the means of achieving them.

Planning, therefore, must anticipate that control is a categorical necessity.

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to planning.

In a typical corporate organ
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then further filters, isolates an
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it to the corporate manager i
guise of useful information.

Thus we can visualize the cor
manager as being surrounded b
functional managers, each talki
him, in effect, in a different lang

What we need, however, is a
common data base for the entire
porate body. Each of the funct
managers draws, as required,
this bank. Naturally, each will
form certain operations on the
before passing it up. Here it is u
to think of a little quasi-algori
which goes:

Data + Analysis = Informati
Information + Judgment = D
sion

The first equation means that
functional manager analyzes porti
of the common data base in the li
of his own department's functi
knowledge and goals. But he has

got to be aware of the relationship of his information to that of all the other functional managers—and of its impact upon corporate goals.

This awareness—this substitution of a corporate overview for a parochial purview—is the province of the management information manager. It is one of his functions to see that manager A, B, C, D and E, etc., all draw from the common data base. He, then, monitors all upward reporting to assure that the data which has been analyzed into information is related—in a common language and with a common purpose—to all other information from the other functional managers.

A hypothetical example will show the system in action. We will concentrate on managers A, D and E who are responsible for, respectively, Personnel Procurement and Training, Procurement, and Research and Development.

This organization, let us say, is procuring a major new weapon system. Manager D, in charge of procurement, reports that this process is on schedule, and he anticipates no major problems. Manager A, who has to procure and train the people to operate and maintain the system, is likewise on target and sees no trouble ahead.

Manager E, the research and development man, is developing a training device which A will have to use to train his people in the system D is procuring. Manager E reports that his entire program is going well.

And it is—from his point of view. The training device is far behind schedule, but it only represents, say, .1 percent of Manager E's total program. So, not relating this small proportion of deviation to the profound impact it will have on the scheduled operation of the entire weapon system, he does not report trouble. He does not see the trouble.

The information manager, however, in monitoring the entire program and tying all the information together, would have seen the warning signs long enough in advance to forestall a major problem. One of the most useful devices at his command in this area is "logic diagramming," of which the well-known PERT network is one example.

In my own headquarters, the Director of Management Analysis functions as the management information manager. The Management Analysis staff also has these responsibilities: It is a servant to the rest of the staff and to the commander; it acts as an educator in management techniques; it is a helper and consultant in analyses conducted within other staff agencies; and it is, above all, a catalyst for speeding up the continual process of analytical improvement.

These functions and duties are, of course, delegated. The responsibility itself cannot be delegated; in the last analysis, the burden resides with the top manager. In my own case, I am taking every means I can conceive of to do two basic things: to promote the growth of genuine analytical capability at all levels of management through the command and to achieve a fundamental, command-wide understanding of the tremendous necessity for that kind of capability.

This is easily said, but by no means automatically done. Like aeronautics and airlift themselves, management is undergoing a revolution, which is being vastly accelerated by electronics. And every revolution has to overcome a tremendous amount of inertia before it becomes self-sustaining.

Max Planck, who himself helped to revolutionize physics, put it this way: "A new truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents eventually die, and a new generation grows up that is familiar with it."

So there is no doubt great hope in the new generation of management that is growing up with electronic computers. But we cannot wait for them to take over, or we will have long since drowned in the flood of information. I would like to conclude, then, by recalling what Norbert Wiener said when someone asserted that man could always pull the plug on the machine before the machine could control man.

With a machine doing millions and billions of calculations a second, Dr. Wiener replied, the man will have been overwhelmed and bypassed long before he can ever know it is time to cut off the power.

Information, including management information, is growing by the microsecond and even the nanosecond. We cannot turn off the flow. We had, therefore, better learn to control it—and we are already running late.

Calendar of Events

June 11-15: American Nuclear Society Meeting, San Diego, Calif.

June 12-14: American Institute of Aeronautics and Astronautics Commerical Aircraft Design and Operation Meeting, Los Angeles, Calif.

June 14-16: 16th Annual Federal Government Accountants Assn. Symposium and Exposition, Sheraton Park Hotel, Washington, D.C.

June 19-21: Heat Transfer and Fluid Mechanics Institute, La Jolla, Calif.

June 20-23: Data Processing Management Assn. Meeting, Boston, Mass.

June 20-26: Society of Nuclear Medicine Meeting, Seattle, Wash.

June 25-30: American Society for Testing Materials Meeting, Boston, Mass.

June 28-30: Joint Automatic Control Conference, Philadelphia, Pa.

July 5-8: National Society of Professional Engineers Meeting, Hartford, Conn.

July 16-29: Engineer Seminar, Fort Belvoir, Va.

July 16-29: Nuclear Science Seminar, Oak Ridge, Tenn.

July 17-19: Reliability and Maintainability Conference, Cocoa Beach, Fla.

July 17-21: American Institute of Aeronautics and Astronautics Propulsion Joint Specialist Conference, Washington, D.C.

July 19-21: National Classification Management Society Annual Seminar, Washington, D.C.

July 23-Aug. 4: Mobility Seminar, Detroit, Mich.

July 27-30: Jaycee International Air Show, Gen. Mitchell Field, Milwaukee, Wis.

Aug. 6-9: American Society of Mechanical Engineers Heat Transfer Conference, Seattle, Wash.

Aug. 13-17: Energy Conversion Engineering Conference, Miami Beach, Fla.

Aug. 14-16: American Institute of Aeronautics and Astronautics Guidance Control and Flight Dynamics Conference, Huntsville, Ala.

Aug. 28-30: Spacecraft Issues for Missions of the 70's Meeting, Olympic Hotel, Seattle, Wash.

Aug. 29-31: Assn. for Computing Machinery Meeting, Washington, D.C.

MEETINGS AND SYMPOSIA

JUNE

Conjugate Point Symposium, June 13-16, at Boulder, Colo. Sponsor: Air Force Cambridge Research Laboratories. Contact: E. J. Chernosky, (CRFG), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01730, (Area Code 617) 274-6100, Ext. 3713.

Conference on High Energy Therapy Dosimetry, June 15-17, at New York, N.Y. Sponsor: Office of Naval Research. Contact: Eunice Thomas Miner, Executive Director, New York Academy of Sciences, 2 E. 63rd St., New York, N.Y. 10021.

Fundamental Physics of the Magnetosphere, June 19-28, at Boston, Mass. Co-sponsors: Air Force Cambridge Research Laboratories and Boston College. Contact: Dr. J. F. McClay, (CRFG), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01731, (Area Code 617), 274-6100, Ext. 3214.

Value Engineering Symposium, June 20, at the Boettcher Auditorium, University of Denver, Denver, Colo. Co-sponsors: Defense Contract Administration Services Office, Denver; and the Defense Contract Services Region, St. Louis. Contact: Maj. H. J. Bukowski, DCASO Denver, 3800 York St., Denver, Colo. 80205, (Area Code 303) 825-1161, Ext. 207.

Computerized Imaging Techniques Seminar, June 26-27, at the Marriott Twin Bridges Motor Hotel, Washington, D.C. Sponsor: Air Force Office of Aerospace Research. Contact: Jerome I. Mantell, Chairman, 18100 Frederick Pike, Gaithersburg, Md. 20760, (Area Code 301) 921-7896.

Field Emission Symposium, June 26-30, at Georgetown University, Washington, D.C. Sponsors: Office of Naval Research, Georgetown University and the National Bureau of Standards. Contact: Lt. Ronald Troutman, Office of Naval Research, Code 427, Room 4102, Main Navy Building, Washington, D.C. 20360, (Area Code 202) OXford 6-2298 or 6-4301.

JULY

1967 Annual Conference on Nuclear and Space Radiation Effect, July 10-14, at Ohio State University, Columbus, Ohio. Sponsors: Institute of Electrical and Electronics Engineers, NASA Office of Advanced Research and Technology, Office of Naval Research and the Department of the Army. Contact: Mr. E. E. Conrad, Harry Diamond Laboratories, Washington, D.C. 20438, (Area Code 202) OXford 6-9126.

1967 Summer Seminar on Mathematics of the Decision Sciences at Stanford University, Palo Alto, Calif., July 10-Aug. 11. Sponsors: Air Force Office of Scientific Research, Atomic Energy Commission, Army Research Office, Small Business Administration, National Bureau of Standards, Office of Naval Research, National Institutes of Health and the National Science Foundation. Contact: Maj. John Jones Jr., (SRMA), Air Force Office of Scientific Research, 1400 Wilson Blvd. Arlington, Va. 22209, (Area Code 202) OXford 4-5261.

Second International Symposium on Nucleonics in Aerospace, July 12-14, at the Sheraton Columbus Hotel, Columbus, Ohio. Sponsors: Air Force Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio; Atomic Energy Commission, and the Instrument Society of America. Contact: Dr. Paul Polishuk, Air Force Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio 45433.

Seminar on Stratosphere and Mesosphere, July 24-Aug. 4, at Stanstead, Quebec, Canada. Co-sponsors: Air Force Cambridge Research Laboratories and McGill University. Contact: H. S. Muench, (CRHB), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01730, (Area Code 617) 274-6100, Ext. 2541.

Earth's Particles and Fields Symposium, July 31- Aug. 11, at Freising, Germany. Sponsor: Air Force Cambridge Research Laboratories, Defense Atomic Support Agency, Office of Naval Research and NATO. Contact: L. Katz, (CRFC), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01730. (Area Code 617) 274-6100, Ext. 3177.

AUGUST

12th Annual Technical Symposium, Aug. 7-11, at the International Hotel, Los Angeles, Calif. Co-sponsors: Air Force Systems Command and the Office of Aerospace Research. Contact: Dr. John H. Atkinson, Technical Program, S.P.I.E. Symposium, P.O. Box 288, Redondo Beach, Calif. 90277.

SEPTEMBER

International Symposium on Information Theory, Sept. 11-15, at Athens, Greece. Co-sponsors: Air Force Office of Scientific Research and the Institute of Electrical and Electronics Engineers. Contact: Lt. Col. B. R. Agins, (SRMA), Air Force Office of Scientific Research, 1400 Wilson Blvd., Arlington, Va. 22209, (Area Code 202) OXford 4-5261.

International Symposium on Materials—Key to Effective Use of the Sea, Sept. 12-14, at the Statler-Hilton Hotel, New York, N.Y. Co-sponsors: Naval Applied Science Laboratory and the Polytechnic Institute of Brooklyn, N.Y. Contact: D. H. Kallas, Associate Technical Director, Naval Applied Science Laboratory, Flushing and Washington Avenues, Brooklyn, N.Y. 11251.

Fourth International Conference on Atmospheric and Space Electricity, Sept. 29-Oct. 6, at Lucerne, Switzerland. Sponsors: Air Force Cambridge Research Laboratories, Army, Navy, National Science Foundation and National Aeronautics and Space Administration. Contact: M. B. Gilbert, (CRTE), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01731, (Area Code 617) 274-6100, Ext. 3633.

DEPARTMENT OF DEFENSE

Maj. Gen. Earl C. Hedlund, USAF, (nominated for promotion to the rank of lieutenant general) has been designated by the Secretary of Defense to be Dir. of the Defense Supply Agency (DSA) effective July 1, 1967. He will succeed Vice Adm. Joseph M. Lyle, USN, who is retiring. Gen. Hedlund has been Dep. Dir. of DSA since Aug. 1964. The new DSA Dep. Dir. has not yet been named.

Brig. Gen. David I. Liebman, USAF, Military Assistant to Asst. Secretary of Defense (Public Affairs) has been ordered to duty as Dep. Dir. for Plans, J-3, U.S. European Command.

Dr. Gardiner L. Tucker, Dir. of Research, International Business Machines Corp., has been selected to become the Dep. Dir. of Defense Research and Engineering (Electronics and Information Systems) effective July 1. He succeeds Thomas F. Rogers who has been appointed Dir., Office of Urban Technology, Department of Housing and Urban Development.

Mr. Thomas J. O'Brien has been designated as Dep. Dir. for Telecommunications Policy, Office of the Asst. Secretary of Defense (Installations and Logistics).

Capt. E. C. Oldfield, USN, has been named Dep. Commander, Defense Industrial Supply Center, Philadelphia, Pa.

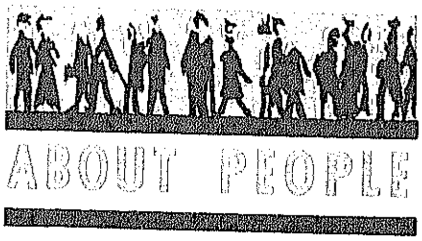
Col. Harley L. Grimm, USAF, has been assigned as Chief, AUTOVON Project Management Office, Defense Communications Agency.

DEPARTMENT OF THE ARMY

Lt. Gen. J. H. Polk has been named Commander-in-Chief, U. S. Army, Europe, effective June 1, in the grade of general, replacing Gen. Andrew P. O'Meara, who will retire.

Dr. William L. Everitt, Dean of Engineering at the University of Illinois, has been appointed as a member of the Advisory Group at U.S. Army Weapons Command, Rock Island, Ill.

The following assignments have been announced by the Office of the Chief of Army Engineers: Brig. Gen. Harry G. Woodbury Jr., Dir. of Civil Works; Brig. Gen. Charles C. Noble, Dep. Dir. of Civil Works; Col. Robert L. Bangert, District Engineer, Port-



land, Ore.; Col. Walter C. Gelini, District Engineer, Rock Island, Ill.; Col. Richard E. McDonnell, District Engineer, Seattle, Wash.; Col. Robert E. Snetzer, District Engineer, Mobile, Ala.; Col. James T. White Jr., District Engineer, Detroit, Mich.; Lt. Col. Wayne S. Nichols, District Engineer, Pittsburgh, Pa.

Lt. Col. John W. Elliott has relieved Col. Karl H. Zornig as Commanding Officer of the Army Aviation Test Activity, Edwards AFB, Calif. Col. Zornig was transferred to the Army Materiel Command in Washington, D.C.

DEPARTMENT OF THE NAVY

RAdm. John P. Sager has been named the Vice Commander, Naval Air Systems Command. He previously served as Asst. Commander for Material Acquisition of the Air Systems Command.

RAdm. Roy S. Benson has relieved RAdm. Means Johnston Jr. as Commandant of the First Naval District headquartered at Boston, Mass.

RAdm. Alexander S. Goodfellow Jr. has been reassigned as Dep. Chief of Naval Material (Development).

RAdm. Thomas J. Walker III has been assigned as Dep. Commander for Plans and Programs and Comptroller, Naval Air Systems Command.

RAdm. Marshall E. Dornin has been named Commandant of the Eleventh Naval District headquartered at San Diego, Calif.

RAdm. Emmett P. Bonner has been assigned as Commander, Mines, Atlantic Fleet.

The following captain assignments have been announced by the Chief of Naval Personnel:

Capt. Edward G. Underhill, Commanding Officer, North Eastern Div., Naval Facilities Engineering Command; Capt. Karl S. Vanmeter, Naval Air Systems Command Representative, Wright-Patterson AFB, Ohio; Capt. Kenan C. Childers Jr., Asst. Commander for Material Acquisition, Naval Air Systems Command; Capt. Perry M. Boothe, Dep. Commander, South Western Div., Naval Facilities Engineering Command; Capt. Robert J. Ney, Dep. Commander, Navy Missile Center, Point Mugu, Calif.

DEPARTMENT OF THE AIR FORCE

Maj. Gen. Charles H. Terhune Jr. has been designated Vice Commander, Air Force Systems Command. He replaces Lt. Gen. Waymond A. Davis who retired on April 30.

Brig. Gen. Jack Bollerud has been assigned as Dep. Chief of Staff (Bioastronautics and Medicine) at Air Force Systems Command headquarters.

Brig. Gen. Joseph N. Donovan has been assigned as Commander, Tactical Airlift Center, Pope AFB, N.C.

Brig. Gen. Clifford J. Kronauer Jr., has been appointed Commander, Air Force Western Test Range, Vandenberg AFB, Calif.

Mr. Robert E. Johnson has been designated Dep. for Programs Analysis in the Office of the Dep. Under Secretary of the Air Force (Manpower).

Col. Rupert P. Collins is the new Dep. Commander, Military Aircraft Storage and Disposal Center, Davis-Monthan AFB, Ariz.

Col. Howard H. Wittrock has been reassigned as Dir., (Plans and Requirements), National Range Div., Air Force Systems Command.

Systems Engineering Group Reassigned within AFSC

The Air Force Systems Command reassigned the Systems Engineering Group (SEG), located at Wright-Patterson AFB, Ohio, from the Research and Technology Division (RTD) to the Aeronautical Systems Division (ASD) effective April 23. No change in location is involved.

Mission responsibility of ASD and SEG will not change, since the primary mission of SEG has been, and is, to provide engineering and technical support to ASD. This internal realignment, therefore, brings the organizational structure more in line with the operational functions of the two organizations.

SEG will continue to be commanded by Brigadier General Gustav E. Lundquist.

LOH Avionics Package

(*Continued from page 3*)

TPPC is feasible and that the concept should be applied to appropriate item and system procurements. Several benefits from TPPC are already apparent in LOHAP. These include:

- Development and acquisition of the item in an intensely competitive environment that produced price as well as technical advantages. In addition to competing reliability, quality, maintainability, etc., a dramatic reduction in size and weight is anticipated. In this latter area alone, the contractor is confident of bettering the target weight of 48 pounds. Compared to about 105 pounds for the current avionics complement that LOHAP replaces, this is a technical achievement of considerable magnitude. This reduction, with its concomitant decrease in size, will, in turn, have a most beneficial impact on cockpit instrumentation, cost per flight hour, increased operating range, etc.
- Increased emphasis on design discipline and configuration management to preclude the dissipation of other benefits by excessive engineering changes.
- Careful, continuing evaluation by the contractor to select the most efficient means of obtaining supplies and services.
- Maximum motivation to the contractor to design for the economical production of equipment that will fill the intended need.

From the standpoint of lessons learned, it also is apparent that greater definition of the logistics and support effort would have enhanced the total package application to LOHAP. These lessons are now being applied to two current ECOM procurements for an airborne radio set, AN/ARC-98, and a tactical fire direction system, TACFIRE. These procurements reflect the LOHAP experience plus the escalation and change-inhibiting features of the C-5A procurement.

As previously noted, extended study of TPPC applications will be required to establish the efficacy of the concept. For this purpose, the Department of the Army has directed periodic review and report on the LOHAP and AN/ARC-98 procurements.

Army Tests New Amphibious Lighters

The Army is evaluating a new series of amphibious lighters—designated LARC V, LARC XV and LARC LX—which will be capable of loading or discharging vessels lying offshore, receiving or delivering cargo at shipside, and transporting cargo over the beach to or from inland supply areas.

LARC LX, reputedly the largest amphibian of its type in the world, is constructed of welded steel and powered by four diesel engines. The huge lighter accommodates a crew of four. Designed to handle a 60-ton payload, it can transport approximately 100 tons in an emergency.

With a 15-ton payload aboard, the LARC XV, constructed of welded aluminum and powered by two diesel engines, can travel 25 miles an hour on a smooth hard surface. The four-wheel, all-wheel drive vehicle makes about 10 miles an hour in the water with the same load.

Evaluation of the new amphibious lighters is being performed at Fort Story, Va., under an accelerated test program established by the U.S. Army Test and Evaluation Command, Aberdeen Proving Ground, Md.

USAF To Build 841 Family Housing Units

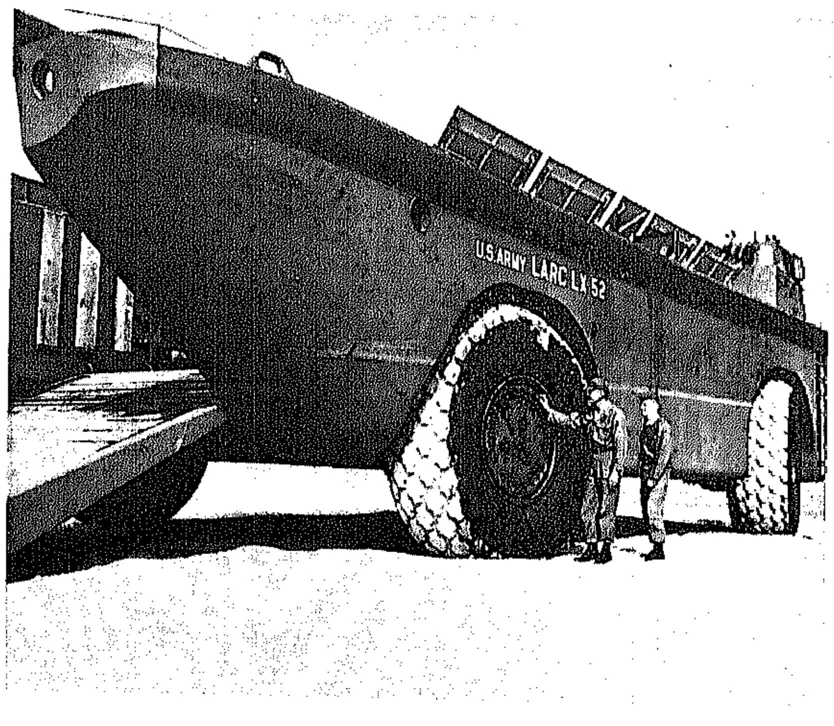
The Air Force has been authorized to proceed with construction of 841 family housing units at seven U.S. bases. Funds released for this purpose total $14,233,453.

The 841 units are part of a total of 8,250 family housing units authorized in the Military Construction Act for FY 1966. Awarding of contracts was temporarily deferred in December 1965.

Major Air Force commands involved in the construction began advertising for bids following receipt of authority March 7.

Construction will be performed at the following Air Force installations:

Cannon AFB, N.M.	150 units
Eglin AFB, Fla.	300 units
Ent AFB, Colo.	40 units
Keesler AFB, Miss.	100 units
Langley AFB, Va.	100 units
Nellis AFB, Nev.	1 unit
Scott AFB, Ill.	150 units



Enlisted technicians of the Army General Equipment Test Activity examine the wheel assembly of the LARC LX, the world's largest amphibious vehicle.

Report on Status of Funds

Sheldon W. Taylor
Dir. for Financial Analysis and Control
Office, Asst. Secretary of Defense (Comptroller)

Appearing in the *Defense Industry Bulletin* for the first time is a reprint (beginning on page 22) of the Report on Status of Funds by Functional Title published by the Office of the Assistant Secretary of Defense (Comptroller). This report shows the monthly progress in obligation of DOD programs and in resultant expenditures. The report covers all military function programs, as well as the Military Assistance Program for which DOD is executive agent.

The report is presented basically in two sections—the first section deals with expenditures (payments) and unpaid obligations (requiring future payment), and the second section with obligational availability, obligations incurred, and unobligated balances. Each section includes DOD-wide summaries for both military functions and a breakout for each of the Military Departments, the Office of the Secretary of Defense/Defense Agencies, and the Office of Civil Defense.

The source data for the report originate in the Military Departments, the Defense Agencies, and the above-mentioned offices. However, the data maintained by these components are not uniform or comparable in every respect. It was this lack of comparability which prompted initiation of the Status of Funds Report shortly after creation of the Defense Department. Officials of DOD had need of comparable figures in order to be able to make meaningful comparisons and to obtain DOD-wide summaries of expenditure and obligation data. The Status of Funds Report was created to meet this need. Since that time the accounting structures of the various DOD components have become more uniform, and it is only in a few areas that the components are required to convert data to the specified uniform classification.

It should be noted that in the section covering obligation transactions, amounts are inclusive of reimburseable work performed by the respective DOD components for each other and for non-DOD agencies. To the extent that the reimburseable orders originate in DOD, an unavoidable duplication occurs in the amounts of obligational availability and in the obligations incurred. An examination is now under way to determine the feasibility of also converting these obligation figures to a net basis.

While initially intended to be used primarily for intra-governmental purposes, the report has been distributed upon request to defense contractors, banks, other businesses, and private economic forecasters on an ever widening basis. Contractors are particularly interested in the data on obligational availability and obligations incurred, since these give a good indication of recent and anticipated contract award activity. Economists, interested in the impact of defense purchases on the economy, examine both obligation and expenditure data since the timing of contractor acquisition of additional labor and material resources typically falls somewhere between the signing of a contract and the incurrence of expenditures by the Government.

Requests for this sort of information have increased to the point that it is difficult to handle queries on an individual basis. In addition, the economic impact of increased defense spending incident to the Vietnam conflict has further heightened interest. The combination of these factors have resulted in a decision to further increase distribution of the report by incorporating it periodically in the *Defense Industry Bulletin.*

The current issue presents data for the first and second quarters of FY 1967. Future issues of the *Bulletin* will present data for subsequent quarters of the fiscal year at quarterly intervals.

All questions concerning the Report on Status of Funds by Functional Title should be directed to:

Directorate for Financial Analysis and Control
Office of Assistant Secretary of Defense (Comptroller)
Room 3C 839
The Pentagon
Washington, D.C. 20301

Report on
Status of Funds
By Functional Title

Department of Defense Military Functions and Military Assistance Program
Expenditures Fiscal Year 1967

(Amounts in Thousands)

Department of Defense

	Expenditures							Unpaid Obligations	
	July 1966	Aug. 1966	Sept. 1966	Oct. 1966	Nov. 1966	Dec. 1966	Cum. thru Dec. 1966	At Start of Year	As of Dec. 31, 1966
Military Personnel									
Active forces	1,077,647	1,344,158	1,426,440	1,421,998	1,338,004	1,471,760	8,080,007	589,609	1,088,356
Reserve forces	96,285	95,866	72,296	73,528	57,648	68,912	464,535	156,797	128,291
Retired pay	140,726	143,946	145,134	146,813	148,087	154,730	879,436	8,052	8,857
Undistributed	80,994	–42,438	–38,878	–1,116	8,971	–87,950	–80,417	–	80,417
Total—Military Personnel	1,395,653	1,541,531	1,604,992	1,641,224	1,552,710	1,607,452	9,343,562	754,459	1,305,920
Operation and Maintenance	1,079,188	1,481,966	1,864,236	1,439,691	1,444,369	1,401,373	8,710,823	3,022,637	3,718,101
Procurement									
Aircraft	844,553	610,597	680,459	568,595	535,922	627,579	3,867,705	7,508,668	8,085,518
Missiles	90,260	152,319	178,566	117,329	179,274	238,074	955,822	2,083,027	1,853,630
Ships	93,975	127,246	114,599	58,497	99,792	154,827	648,936	2,867,571	3,198,708
Tracked combat vehicles	11,929	1,230	9,880	20,799	18,943	20,267	83,048	449,010	563,779
Ordnance, vehicles, & related equip.	168,994	212,458	237,520	288,066	264,774	345,386	1,517,198	6,110,216	6,755,155
Electronics and communications	64,595	102,063	91,395	81,970	135,795	107,975	583,793	1,855,134	1,716,380
Other procurement	181,638	93,605	104,734	96,883	114,052	120,842	711,754	1,582,769	1,626,398
Undistributed	103,882	67,612	47,936	60,893	–5,120	12,658	287,861	–337,631	–626,831
Total—Procurement	1,559,826	1,367,128	1,465,094	1,293,027	1,343,437	1,627,603	8,656,115	22,118,764	23,172,736
Research, Development, Test, & Evaluation									
Military sciences	64,401	103,146	99,903	74,290	82,974	79,697	504,411	891,487	822,310
Aircraft	71,001	83,637	96,043	99,359	87,001	102,112	539,153	539,278	665,219
Missiles	117,625	186,861	199,550	206,729	189,729	229,929	1,130,423	1,097,218	1,471,891
Astronautics	80,905	91,049	102,205	76,739	45,389	116,689	512,976	599,546	501,133
Ships	29,914	31,088	27,025	26,519	23,696	24,543	162,785	204,792	209,820
Ordnance, vehicles, & related equip.	20,391	25,656	36,639	23,191	28,025	31,103	165,005	237,072	292,765
Other equipment	35,763	46,956	63,653	46,854	53,790	54,315	301,331	480,164	536,177
Program-wide management & support	38,078	41,213	39,969	40,834	28,154	33,216	221,464	154,656	164,753
Undistributed	76,114	59,594	26,013	–24,665	24,812	–31,155	130,713	–145,833	–277,012
Total—Research, Development, Test, & Evaluation	534,192	669,202	691,001	569,846	563,569	640,452	3,668,262	4,058,380	4,387,055
Military Construction	128,188	160,507	121,286	196,533	139,684	126,858	873,056	1,309,722	1,134,072
Family Housing	40,127	48,181	49,111	49,423	50,737	38,030	275,609	130,266	116,712
Civil Defense	4,827	8,141	10,686	6,181	7,417	11,317	48,569	77,877	81,747
Other—Special Foreign Currency Program	–	–	–	–	–	–	–	–	–
Revolving and Management Funds*	–81,277	75,876	–80,972	89,175	160,253	241,725	404,780	658,208	–261,348
Subtotal—Military Functions	4,660,723	5,352,531	5,725,435	5,285,100	5,262,177	5,694,810	31,980,776	32,130,313	33,654,994
Military Assistance	6,370	51,386	47,134	61,358	76,867	62,638	305,753	1,816,161	2,168,773
TOTAL—DEPARTMENT OF DEFENSE	4,667,093	5,403,917	5,772,569	5,346,458	5,339,044	5,757,448	32,286,529	33,946,474	35,823,767

* Includes In-Transit Stock Fund charges not reflected in Service amounts below.
NOTE: Amounts will not necessarily add to totals due to rounding.

Department of the Army

	Expenditures							Unpaid Obligations	
	July 1966	Aug. 1966	Sept. 1966	Oct. 1966	Nov. 1966	Dec. 1966	Cum. thru Dec. 1966	At Start of Year	As of Dec. 31, 1966
Military Personnel									
Active forces	286,518	482,996	563,240	569,891	529,900	612,436	3,044,981	320,524	532,299
Reserve forces	60,349	67,827	51,269	46,382	39,146	48,098	313,071	114,434	87,473
Undistributed	79,429	-34,811	-69,089	-4,481	15,139	-69,658	-83,471	-	83,471
Total—Military Personnel	426,296	516,012	545,420	611,792	584,185	590,876	3,274,581	434,958	703,245
Operation and Maintenance	402,415	440,747	883,202	543,001	504,745	419,559	3,193,669	881,122	1,176,414
Procurement									
Aircraft	63,477	70,021	64,775	67,072	78,517	91,026	434,888	1,137,653	1,182,822
Missiles	14,982	15,635	18,171	24,972	30,029	21,944	125,733	537,097	453,789
Tracked combat vehicles	11,912	1,149	9,695	20,560	18,560	20,161	82,037	432,565	544,288
Ordnance, vehicles, and related equipment	71,653	116,867	126,937	173,044	134,503	134,341	757,345	3,421,137	3,439,979
Electronics and communications	3,850	29,826	29,641	26,603	68,354	27,550	185,824	738,404	698,998
Other procurement	24,786	41,225	38,687	57,120	42,579	48,037	252,434	666,038	637,188
Undistributed	102,141	68,167	45,124	38,566	-7,544	20,926	267,380	-337,631	-606,350
Total—Procurement	292,801	342,890	333,028	407,939	364,998	363,984	2,105,640	6,595,263	6,350,712
Research, Development, Test, and Evaluation									
Military sciences	9,408	13,734	13,092	13,707	11,505	13,896	75,342	120,589	148,550
Aircraft	7,728	8,820	10,966	8,478	9,344	11,889	57,225	92,925	91,132
Missiles	24,527	65,788	49,504	68,994	50,231	82,573	341,617	461,337	588,563
Astronautics	2,675	2,987	1,570	1,453	1,843	1,662	12,190	20,741	15.289
Ordnance, vehicles, and related equipment	10,328	9,954	12,011	12,364	16,797	18,316	79,770	139,922	182,220
Other equipment	14,165	16,751	21,620	17,931	24,645	18,157	113,269	197,438	205,246
Program-wide management and support	5,506	10,360	4,341	8,840	5,439	7,442	41,928	31,310	39,684
Undistributed	68,086	46,294	38,478	-8,659	7,867	-19,909	132,157	-145,833	-278,456
Total—Research, Development, Test, and Evaluation	142,422	174,689	151,582	123,107	127,672	134,025	853,497	918,429	992,228
Military Construction	2,675	7,126	9,487	36,317	32,584	37,923	126,112	518,995	682,702
Revolving and Management Funds	-135,657	-138,807	-217,768	-90,569	114,934	181,190	-286,677	40,077	-147,171
TOTAL—DEPARTMENT OF THE ARMY	1,130,953	1,342,655	1,704,952	1,631,589	1,729,117	1,727,556	9,266,822	9,388,844	9,758,127

	Expenditures							Unpaid Obligations	
	July 1966	Aug. 1966	Sept. 1966	Oct. 1966	Nov. 1966	Dec. 1966	Cum. thru Dec. 1966	At Start of Year	As of Dec. 31, 1966
Military Personnel									
Active forces	376,835	405,217	439,382	412,828	369,631	402,486	2,406,379	141,289	309,914
Reserve forces	15,153	14,725	11,826	11,727	11,363	10,856	75,650	20,898	19,565
Undistributed	1,630	-7,680	8,069	4,133	-3,965	1,197	3,384	–	-3,384
Total—Military Personnel	393,618	412,262	459,277	428,688	377,029	414,539	2,485,413	162,187	326,095
Operation and Maintenance	277,917	585,863	353,975	384,619	400,711	431,206	2,434,291	1,230,060	1,221,460
Procurement									
Aircraft	185,066	201,461	206,146	204,670	222,168	256,026	1,275,537	2,818,833	2,669,126
Missiles	40,178	38,531	40,079	10,710	38,098	58,169	225,765	560,035	467,427
Ships	93,975	127,246	114,599	58,497	99,792	154,827	648,936	2,867,571	3,198,708
Tracked combat vehicles	17	81	185	239	383	106	1,011	16,445	19,491
Ordnance, vehicles, and related equipment	43,109	56,452	59,637	71,298	66,131	120,677	417,304	1,418,223	1,495,632
Electronics and communications	25,687	32,897	29,561	30,072	27,543	38,353	184,113	589,237	540,156
Other procurement	40,832	43,819	36,999	25,940	50,498	45,671	243,759	726,357	778,525
Undistributed	52	-5,339	10,243	13,812	4,327	-1,000	22,095	–	-22,095
Total—Procurement	428,915	495,147	497,453	415,235	508,941	672,827	3,018,518	8,996,701	9,146,971
Research, Development, Test, and Evaluation									
Military sciences	13,729	19,157	40,524	11,938	10,748	15,182	111,278	137,459	117,168
Aircraft	12,911	21,008	22,251	29,776	18,134	5,173	109,253	159,020	144,589
Missiles	42,959	53,818	58,752	53,129	65,930	61,355	335,943	249,864	391,086
Astronautics	1,280	2,135	2,487	2,552	1,551	2,366	12,371	15,876	12,869
Ships	29,914	31,088	27,025	26,519	23,696	24,543	162,785	204,792	209,820
Ordnance, vehicles, and related equipment	10,063	15,702	24,628	10,827	11,228	12,787	85,235	97,150	110,545
Other equipment	4,779	7,051	7,840	5,935	4,631	7,006	37,242	61,511	63,025
Program-wide management and support	9,596	10,434	10,383	11,927	3,132	3,963	49,435	88,594	87,663
Undistributed	5,733	1,120	3,785	-21,232	2,458	12,434	4,298	–	-4,298
Total—Research, Development, Test, & Evaluation	130,964	161,513	197,675	131,371	141,508	144,809	907,840	1,014,266	1,132,467
Military Construction	105,735	137,563	103,084	87,829	52,747	38,840	525,798	323,771	50,407
Revolving and Management Funds	-76,072	-251,506	86,350	120,712	44,827	-53,018	-128,707	617,445	557,877
TOTAL—DEPARTMENT OF THE NAVY	1,261,078	1,540,841	1,697,814	1,568,455	1,525,763	1,649,202	9,243,154	12,344,431	12,435,277

Department of the Air Force

	Expenditures							Unpaid Obligations	
	July 1966	Aug. 1966	Sept. 1966	Oct. 1966	Nov. 1966	Dec. 1966	Cum. thru Dec. 1966	At Start of Year	As of Dec. 31, 1966
Military Personnel									
Active forces	414,294	455,945	423,818	439,279	438,473	456,838	2,628,647	127,796	246,143
Reserve forces	20,783	13,314	9,201	15,419	7,139	9,958	75,814	21,465	21,253
Undistributed	-65	53	22,142	-768	-2,203	-19,489	-330	-	330
Total—Military Personnel	435,012	469,312	455,161	453,930	443,409	447,307	2,704,131	149,261	267,726
Operation and Maintenance	326,870	378,501	535,068	451,463	466,719	474,808	2,633,429	805,314	1,204,194
Procurement									
Aircraft	596,010	339,115	409,538	296,853	235,237	280,527	2,157,280	3,552,182	4,233,570
Missiles	35,100	98,153	120,316	81,647	111,147	157,961	604,324	985,895	932,414
Ordnance, vehicles and related equipment	54,232	38,813	50,847	43,581	63,937	90,047	341,457	1,269,060	1,817,995
Electronics and communications	34,466	38,728	30,507	24,780	39,452	41,114	209,047	519,055	470,732
Other procurement	114,544	7,452	27,809	12,397	19,709	21,391	203,302	153,725	168,974
Undistributed	1,793	4,576	-7,445	8,390	-2,331	-6,759	-1,776	-	1,776
Total—Procurement	836,145	526,837	631,573	467,646	467,154	584,279	3,513,634	6,479,917	7,625,461
Research, Development, Test, and Evaluation									
Military sciences	12,026	14,421	10,983	10,465	11,395	13,918	73,208	131,634	122,611
Aircraft	50,362	53,809	62,826	61,105	59,523	85,050	372,675	287,333	429,498
Missiles	50,139	67,255	91,294	84,606	73,568	86,001	452,863	386,017	492,242
Astronautics	76,950	85,927	98,148	72,734	41,995	112,661	488,415	562,929	472,975
Other equipment	16,819	23,154	34,193	22,988	24,514	29,152	150,820	221,215	267,906
Program-wide management and support	22,976	20,419	25,245	20,067	19,583	21,811	130,101	34,752	37,406
Undistributed	2,294	12,181	-16,250	5,226	14,487	-23,680	-5,742	-	5,742
Total—Research, Development, Test, & Evaluation	231,567	277,166	306,441	277,188	245,063	324,916	1,662,341	1,623,880	1,828,380
Military Construction	16,293	17,428	6,072	71,643	53,223	49,012	213,671	442,931	381,908
Revolving and Management Funds	-64,285	29,871	-2,443	6,971	-6,463	-52,053	-88,402	686	-4,493
TOTAL—DEPARTMENT OF THE AIR FORCE	1,781,602	1,699,115	1,931,873	1,728,840	1,669,104	1,828,270	10,638,804	9,501,989	11,303,176

Defense Agencies/Office of the Secretary of Defense

	Expenditures							Unpaid Obligations	
	July 1966	Aug. 1966	Sept. 1966	Oct. 1966	Nov. 1966	Dec. 1966	Cum. thru Dec. 1966	At Start of Year	As of Dec. 31, 1966
Military Personnel									
Retired Pay	140,726	143,946	145,134	146,813	148,087	154,730	879,436	8,052	8,857
Operation and Maintenance	71,985	76,856	91,991	60,607	72,196	75,800	449,435	106,140	116,032
Procurement									
Ordnance, vehicles, and related equipment	–	326	99	143	203	321	1,092	1,796	1,549
Electronics and communications	592	612	1,686	515	446	958	4,809	8,438	6,494
Other procurement	1,476	1,109	1,239	1,426	1,266	5,743	12,259	36,649	41,711
Undistributed	–104	208	14	125	428	–509	162	–	–162
Total—Procurement	1,964	2,255	3,039	2,208	2,344	6,512	18,322	46,883	49,592
Research, Development, Test, and Evaluation									
Military sciences	29,238	55,834	35,304	38,180	49,326	36,701	244,583	501,805	433,981
Military Construction	3,485	–1,611	2,644	743	1,131	1,084	7,476	24,025	19,054
Family Housing	40,127	48,181	49,111	49,423	50,737	38,030	275,609	130,266	116,712
Other—Special Foreign Currency Program	–	–	–	–	–	–	–	–	–
Revolving and Management Funds	–11,141	41,146	28,309	58,033	53,942	76,102	246,391	–	–5,385
TOTAL—DEFENSE AGENCIES/OSD	276,385	366,606	355,532	356,007	377,762	388,960	2,121,252	817,172	738,841

Office of Civil Defense

	July 1966	Aug. 1966	Sept. 1966	Oct. 1966	Nov. 1966	Dec. 1966	Cum. thru Dec. 1966	At Start of Year	As of Dec. 31, 1966
Civil Defense	4,827	8,141	10,686	6,181	7,417	11,317	48,569	77,877	81,747
Revolving and Management Funds	*	*	–1	–	–	–	–1	–	–
TOTAL—OFFICE OF CIVIL DEFENSE	4,827	8,141	10,685	6,181	7,417	11,317	48,568	77,877	81,747

Military Assistance

	July 1966	Aug. 1966	Sept. 1966	Oct. 1966	Nov. 1966	Dec. 1966	Cum. thru Dec. 1966	At Start of Year	As of Dec. 31, 1966
Military Personnel	–	–	–		–	5	5	72	53
Operation and Maintenance	9,262	27,418	29,706	22,107	30,628	17,067	136,188	364,523	31,165
Procurement									
Aircraft	296	35,012	3,970	10,152	12,274	33,415	95,119	339,429	286,630
Missiles	80	1,250	965	5,673	1,829	1,807	11,604	67,918	58,586
Ships	–	537	1,336	113	643	434	3,063	114,172	126,330
Ordnance, vehicles, and related equipment	56	3,771	9,381	7,736	11,168	7,005	39,117	248,867	268,283
Electronics and communications	1,150	8,850	1,604	4,471	3,235	3,479	22,789	181,174	171,099
Other procurement	–2,037	4,226	48	5,585	5,415	4,331	17,568	138,193	141,818
Total—Procurement	–455	53,645	17,306	33,728	34,565	50,473	189,262	1,089,753	1,052,744
Research, Development, Test, and Evaluation	–	–	–	73	–	24	97	3,084	2,064
Military Construction	913	1,150	5,071	1,434	4,885	709	14,162	151,977	139,824
Revolving Fund	–3,190	405	619	464	8,400	–5,507	1,251	158,605	635,168
Undistributed	–158	31,232	–5,568	3,552	–1,671	–133	–35,210	48,148	307,756
TOTAL—MILITARY ASSISTANCE	6,370	51,386	47,134	61,358	76,867	62,638	305,753	1,816,161 [a]	2,168,773

[a] Consistent with the decision to treat reservations under limitation .002 as obligations in reports commencing with FY 1967, the unpaid obligations at start of year are comprised of obligations/reservations and, thus, differ from the unpaid obligations shown in the report for June 30, 1966.
* Less than $500.

Obligations
Fiscal Year 1967
(Amounts in Thousands)
Department of Defense

	Available for Obligation	Obligations July 1966	Aug. 1966	Sept. 1966	Oct. 1966	Nov. 1966	Dec. 1966	Cum. thru Dec. 31, 1966	Unobligated Balance Dec. 31, 1966
Military Personnel									
Active forces	16,207,095	1,438,480	1,464,093	1,404,108	1,492,694	1,392,227	1,457,216	8,648,818	7,558,277
Reserve forces	937,814	130,578	85,012	55,123	60,247	58,673	55,221	444,854	492,960
Retired pay	1,780,000	140,788	143,613	145,199	147,225	148,433	155,055	880,313	899,687
Total—Military Personnel	18,924,909	1,709,846	1,692,717	1,604,431	1,700,166	1,599,332	1,667,493	9,973,985	8,950,924
Operation and Maintenance	17,773,319	1,769,836	1,928,838	1,720,384	1,561,965	1,636,542	1,536,872	10,154,437	7,618,882
Procurement									
Aircraft	11,589,559	624,342	960,726	1,049,998	755,962	635,642	712,520	4,739,190	6,850,369
Missiles	2,789,910	74,288	188,223	156,795	114,815	173,528	141,324	848,973	1,940,937
Ships	5,157,638	303,994	248,862	60,015	102,568	77,428	240,172	1,033,039	4,124,599
Tracked combat vehicles	564,176	26,360	3,122	76,964	41,900	39,810	27,424	215,580	348,596
Ordnance, vehicles & related equip.	6,457,112	95,653	604,066	368,983	549,460	376,234	512,579	2,506,975	3,950,137
Electronics and communications	1,899,650	43,744	58,445	67,990	89,121	98,534	137,846	495,680	1,403,970
Other procurement	2,072,262	128,888	162,266	64,006	160,950	118,881	169,130	804,121	1,268,141
Undistributed	-395,241	–	-1	+1	–	-7	7	–	-395,241
Total—Procurement	30,135,063	1,297,272	2,225,709	1,844,746	1,814,779	1,520,054	1,940,995	10,643,555	19,491,507
Research, Development, Test, and Evaluation									
Military sciences	1,263,825	60,621	69,646	98,236	70,217	98,575	70,696	467,991	795,834
Aircraft	1,414,363	179,731	125,935	155,196	66,836	50,249	97,930	675,877	738,486
Missiles	2,427,815	251,177	318,776	519,302	225,283	119,873	107,357	1,541,768	886,047
Astronautics	1,420,036	48,668	107,804	96,693	111,312	29,134	120,130	513,741	906,295
Ships	378,640	32,200	30,944	52,922	18,717	18,883	24,265	177,931	200,709
Ordnance, vehicles & related equip.	428,666	18,827	64,048	77,141	28,987	23,280	26,284	238,567	190,009
Other equipment	876,291	35,914	108,137	95,019	41,795	54,878	41,236	376,979	499,312
Program-wide management and support	693,593	57,935	49,669	64,448	50,840	56,079	40,479	319,450	374,143
Emergency Fund	18,195	–	–	–	–	–	–	–	18,195
Undistributed	175,878	–	-76	76	-6	6	–	–	175,878
Total—Research, Development, Test, & Evaluation	9,097,302	685,074	874,792	1,159,122	613,980	450,958	528,376	4,312,304	4,784,999
Military Construction	2,736,365	112,169	107,635	161,186	114,942	122,134	119,277	737,343	1,999,022
Family Housing	729,130	47,462	42,187	41,777	44,866	41,693	47,711	265,696	463,435
Civil Defense	141,550	5,927	4,342	8,829	8,529	13,620	13,009	54,256	87,294
Other—Special Foreign Currency Program	7,348	–	–	–	–	–	–	–	7,348
Subtotal—Military Functions	79,544,986	5,627,586	6,876,218	6,540,478	5,859,225	5,384,336	5,853,732	36,141,575	43,403,411
Military Assistance	742,867	187,257	20,253	-5,324	45,590	-16,914	82,128	312,990	429,877
TOTAL—DEPARTMENT OF DEFENSE	80,287,853	5,814,843	6,896,472	6,535,154	5,904,814	5,367,422	5,935,860	36,454,565	43,833,288

Department of the Army

	Available for Obligation	Obligations July 1966	Aug. 1966	Sept. 1966	Oct. 1966	Nov. 1966	Dec. 1966	Cum. thru Dec. 31, 1966	Unobligated Balance Dec. 31, 1966
Military Personnel									
Active forces	6,286,703	540,119	542,348	530,112	608,703	515,345	558,691	3,295,318	2,991,385
Reserve forces	636,644	96,350	52,841	34,716	39,629	38,040	32,176	293,752	342,892
Total—Military Personnel	6,923,347	636,469	595,189	564,828	648,332	553,385	590,867	3,589,070	3,334,277
Operation and Maintenance	6,211,174	661,876	665,902	712,267	483,886	564,479	650,360	3,738,770	2,472,404
Procurement									
Aircraft	938,513	–2,064	9,679	85,901	79,426	114,845	196,796	484,583	453,930
Missiles	707,369	4,639	5,487	26,159	12,774	35,269	17,388	101,716	605,653
Tracked combat vehicles	548,386	25,392	2,778	77,060	41,579	39,972	24,742	211,523	336,863
Ordnance, vehicles and related equipment	3,220,907	46,570	59,487	193,026	275,043	217,655	325,247	1,117,028	2,103,879
Electronics and communications	579,493	21,600	18,195	28,216	20,650	40,896	31,146	160,703	418,790
Other procurement	625,536	14,542	20,948	37,767	44,991	32,465	90,162	240,875	384,661
Undistributed	7,562	–	–	–	–	–7	7	–	7,562
Total—Procurement	6,627,766	110,680	116,577	448,124	474,464	481,095	685,486	2,316,426	4,311,340
Research, Development, Test, & Evaluation									
Military sciences	249,444	30,030	16,512	13,842	15,685	28,518	9,155	113,742	135,702
Aircraft	137,858	3,855	24,214	5,916	5,939	8,055	9,138	57,117	80,741
Missiles	768,263	45,409	28,423	295,954	56,532	23,484	24,683	474,485	293,778
Astronautics	19,623	186	1,230	687	1,722	1,140	1,975	6,940	12,683
Ordnance, vehicles and related equipment	240,237	14,082	54,080	26,041	14,063	13,758	17,900	139,924	100,313
Other equipment	372,312	14,693	26,427	31,399	15,525	20,465	20,865	129,374	242,938
Program-wide management and support	96,117	13,445	17,465	6,799	7,292	7,184	5,462	57,647	38,470
Undistributed	3,271	–	–	–	–6	6	–	–	3,271
Total—Research, Development, Test, & Evaluation	1,887,125	121,700	168,351	380,637	116,753	102,610	89,178	979,229	907,896
Military Construction	1,296,885	58,824	49,706	129,748	55,388	52,439	54,685	400,790	896,095
TOTAL—DEPARTMENT OF THE ARMY	22,946,298	1,589,550	1,595,723	2,235,604	1,778,824	1,754,007	2,070,578	11,024,286	11,922,012

	Available for Obligation	Obligations							Unobligated Balance Dec. 31, 1966
		July 1966	Aug. 1966	Sept. 1966	Oct. 1966	Nov. 1966	Dec. 1966	Cum. thru Dec. 31, 1966	
Military Personnel									
Active forces	4,876,592	430,571	427,296	429,754	432,430	423,842	448,745	2,592,638	2,283,954
Reserve forces	149,320	17,273	15,608	9,766	11,080	9,665	10,557	73,949	75,371
Total—Military Personnel	5,025,912	447,843	442,905	439,520	443,510	433,508	459,301	2,666,587	2,359,325
Operation and Maintenance	5,029,849	340,885	575,579	359,416	500,987	519,743	382,951	2,679,561	2,350,288
Procurement									
Aircraft	3,556,609	8,143	125,745	306,284	246,184	303,217	155,731	1,145,304	2,411,305
Missiles	521,045	204	45,161	27,797	20,527	27,221	19,218	140,128	380,917
Ships	5,157,638	303,994	248,862	60,015	102,568	77,428	240,172	1,033,039	4,124,599
Tracked combat vehicles	15,790	968	341	–93	321	–162	2,682	4,057	11,733
Ordnance, vehicles and related equipment	1,666,162	9,346	30,773	104,940	128,114	102,124	123,389	498,686	1,167,476
Electronics and communications	688,424	3,591	10,461	18,190	33,025	17,832	54,831	137,930	550,494
Other procurement	1,045,719	5,948	115,533	15,129	82,318	49,747	56,000	324,675	721,044
Undistributed	–693,962	–	–	–	–	–	–	–	–693,962
Total—Procurement	11,957,422	332,194	576,879	532,259	613,056	577,407	652,022	3,283,817	8,673,605
Research, Development, Test, and Evaluation									
Military sciences	224,019	16,203	7,269	30,402	12,098	10,863	22,055	98,890	125,129
Aircraft	375,704	2,709	31,890	23,750	10,705	8,157	17,642	94,853	280,851
Missiles	698,753	108,705	67,235	125,241	116,086	33,161	29,433	479,861	218,892
Astronautics	24,858	373	858	4,954	2,944	161	–11	9,279	15,579
Ships	378,640	32,200	30,944	52,922	18,717	18,883	24,265	177,931	200,709
Ordnance, vehicles, and related equipment	188,429	4,745	9,878	51,190	14,924	9,522	8,384	98,643	89,786
Other equipment	114,183	2,502	10,537	13,940	6,399	2,711	4,813	40,902	73,281
Program-wide management and support	366,763	9,798	20,053	26,029	24,919	26,602	13,955	121,356	245,407
Undistributed	124,355	–	–	–	–	–	–	–	124,355
Total Research, Development, Test, & Evaluation	2,495,704	177,235	178,664	328,428	206,792	110,060	120,536	1,121,715	1,373,989
Military Construction	755,409	33,473	54,502	4,334	5,818	48,747	34,084	180,958	574,451
TOTAL—DEPARTMENT OF THE NAVY	25,264,297	1,331,633	1,828,524	1,663,958	1,770,165	1,689,465	1,648,895	9,932,639	15,331,657

Department of the Air Force

	Available for Obligation	Obligations July 1966	Aug. 1966	Sept. 1966	Oct. 1966	Nov. 1966	Dec. 1966	Cum. thru Dec. 31, 1966	Unobligated Balance Dec. 31, 1966
Military Personnel									
Active forces	5,043,800	467,790	494,449	444,242	451,561	453,040	449,780	2,760,862	2,282,938
Reserve forces	151,850	16,955	16,563	10,641	9,538	10,968	12,488	77,153	74,697
Total—Military Personnel	5,195,650	484,745	511,011	454,884	461,099	464,008	462,268	2,838,015	2,357,635
Operation and Maintenance	5,630,478	685,279	602,361	565,502	495,714	472,097	423,676	3,244,629	2,385,849
Procurement									
Aircraft	7,094,437	618,263	825,302	657,813	430,352	217,580	359,993	3,109,303	3,985,134
Missiles	1,561,496	69,445	137,575	102,839	81,514	111,039	104,717	607,129	954,367
Ships	–	–	–	–	–	–	–	–	–
Ordnance, vehicles and related equipment	1,566,635	39,733	513,829	70,960	146,302	55,900	63,668	890,392	676,243
Electronics and communications	614,838	18,280	29,606	21,542	34,603	38,950	51,201	194,182	420,656
Other Procurement	332,941	108,025	18,406	7,691	28,739	33,535	22,155	218,551	114,390
Undistributed	283,089	–	–	–	–	–	–	–	283,089
Total—Procurement	11,453,435	853,746	1,524,717	860,845	721,512	457,005	601,733	5,019,558	6,433,877
Research, Development, Test, & Evaluation									
Military sciences	209,098	6,099	13,762	15,162	13,492	17,463	12,253	78,231	130,867
Aircraft	900,801	173,167	69,831	125,530	50,192	34,037	71,150	523,907	376,894
Missiles	960,799	97,063	223,118	98,107	52,665	63,228	53,241	587,422	373,377
Astronautics	1,375,555	48,109	105,716	91,052	106,646	27,833	118,166	497,522	878,033
Other equipment	389,796	18,719	71,173	49,680	19,871	31,702	15,558	206,703	183,093
Program-wide management and support	230,713	34,692	12,151	31,620	18,629	22,293	21,062	140,447	90,266
Undistributed	48,252	–	–76	76	–	–	–	–	48,252
Total—Research, Development, Test, & Evaluation	4,115,013	377,851	495,673	411,228	261,492	196,557	291,430	2,034,231	2,080,782
Military Construction	665,617	19,368	3,135	25,314	53,826	20,938	30,509	153,090	512,526
TOTAL—DEPARTMENT OF THE AIR FORCE	27,060,194	2,420,989	3,136,899	2,317,772	1,993,643	1,610,604	1,809,616	13,289,523	13,770,670

Defense Agencies/Office of the Secretary of Defense

	Available for Obligation	Obligations July 1966	Aug. 1966	Sept. 1966	Oct. 1966	Nov. 1966	Dec. 1966	Cum. thru Dec. 31, 1966	Unobligated Balance Dec. 31, 1966
Military Personnel									
Retired Pay	1,780,000	140,788	143,613	145,199	147,225	148,433	155,055	880,313	899,687
Operation and Maintenance	901,818	81,796	84,996	83,200	81,376	80,224	79,884	491,476	410,342
Procurement									
Ordnance, vehicles and related equipment	3,408	4	–23	57	1	555	275	869	2,539
Electronics and communications	16,895	273	183	42	843	856	668	2,865	14,030
Other procurement	68,066	373	7,378	3,420	4,902	3,136	811	20,020	48,046
Undistributed	8,070	–	–	–	–	–	–	–	8,070
Total—Procurement	96,439	650	7,538	3,519	5,746	4,547	1,754	23,754	72,685
Research, Development, Test, and Evaluation									
Military sciences	581,264	8,289	32,103	38,830	28,942	41,731	27,233	177,128	404,136
Emergency Fund	18,195	–	–	–	–	–	–	–	18,195
Undistributed	–	–	–	–	–	–	–	–	
Total—Research, Development, Test, & Evaluation	599,459	8,289	32,103	38,830	28,942	41,731	27,233	177,128	422,332
Military Construction	18,453	504	292	1,790	–90	10	13,443	2,504	15,949
Family Housing	729,130	47,462	42,187	41,777	44,866	41,693	47,711	265,696	463,435
Other—Special Foreign Currency Program	7,348	–	–	–	–	–	–	–	7,348
TOTAL—DEFENSE AGENCIES/OSD	4,132,648	279,488	310,730	314,314	308,065	316,639	311,635	1,840,871	2,291,777

Office of Civil Defense

	Available for Obligation	July 1966	Aug. 1966	Sept. 1966	Oct. 1966	Nov. 1966	Dec. 1966	Cum. thru Dec. 31, 1966	Unobligated Balance Dec. 31, 1966
Civil Defense	141,550	5,927	4,342	8,829	8,529	13,620	13,009	54,256	87,294

Military Assistance

	Available for Obligation	July 1966	Aug. 1966	Sept. 1966	Oct. 1966	Nov. 1966	Dec. 1966	Cum. thru Dec. 31, 1966	Unobligated Balance Dec. 31, 1966
Military Personnel	–12	–	–	–12	–	–	–	–12	–
Operation and Maintenance	493,956	106,601	13,125	11,415	15,390	–7,370	19,235	158,396	335,560
Procurement									
Aircraft	42,608	18,366	5,186	–423	18,534	–7,476	8,132	42,319	289
Missiles	2,777	3,433	–1,116	–1,209	549	31	584	2,272	505
Ships	26,141	3,448	831	3,375	109	282	7,175	15,220	10,921
Ordnance, vehicles and related equipment	58,557	32,705	4,326	–9,815	978	–3,007	33,346	59,533	24
Electronics and communications	12,722	8,188	1,877	–4,453	1,746	489	4,865	12,712	10
Other procurement	22,363	7,725	1,133	–4,219	6,349	1,972	8,234	21,194	1,169
Total—Procurement	165,168	73,866	12,236	–16,744	28,265	–7,707	62,336	152,252	12,916
Research, Development, Test, and Evaluation	–	–	–13	–	–3	1	–909	–924	924
Military Construction	85,734	1,188	384	140	1,968	–1,842	75	1,913	83,821
Undistributed	–1,979	5,603	–5,480	–123	–29	–	1,394	1,365	–3,343
TOTAL—MILITARY ASSISTANCE	742,867	187,257	20,253	–5,324	45,590	–16,914	82,128	312,990	429,877

NOTE: Commencing with reports in FY 1967, reservations under limitation .002 of the Military Assistance Program are being treated as obligations.

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RESEARCH REPORTS

Authorized DOD contractors and grantees may obtain these documents without charge from:

Defense Documentation Center
Cameron Station
Alexandria, Va. 22314

Others may purchase these documents at the price indicated from:

Clearinghouse for Federal and Scientific Information
Department of Commerce
Springfield, Va. 22151

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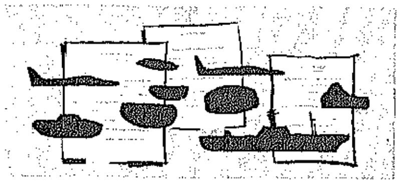

DEFENSE PROCUREMENT

tracts of $1,000,000 and over rded during the month of April 7:

DEFENSE SUPPLY AGENCY

Gulf Oil Corp., Houston, Tex. $1,591,765. Fuel oil and gasoline products to be delivered to various installations on the east coast. Defense Fuel Supply Center, Alexandria, Va.
Ingersoll Products, Borg-Warner Corp., Chicago, Ill. $2,657,674. 811,980 steel helmets. Defense Personnel Support Center, Philadelphia, Pa.
General Aniline and Film Corp., New York, N.Y. $1,867,380. 85,804 various sized packages of radiographic film. Defense Personnel Support Center.
J. P. Stevens & Co., New York, N.Y. $1,-141,517. 1,958,250 linear yards of cotton cloth. Defense Personnel Support Center, Philadelphia, Pa.
d-R-S Mfg. Co., Flora, Miss. $1,690,378. 25 construction tractors and 25 scrapers. Defense Construction Supply Center, Columbus, Ohio.
Humble Oil & Refining Co., Houston, Tex. 3,742,209. 900,000 barrels of Arctic diesel uel oil. Defense Fuel Supply Center, Alexandria, Va.
Riegel Textile Corp., New York, N.Y. $8,-79,318. 20,346,000 square yards of cotton ateen cloth. Defense Personnel Support Center, Philadelphia, Pa.
. P. Stevens & Co., New York, N.Y. $3,-59,520. 8,000,000 square yards of cotton ateen cloth. Defense Personnel Support Center, Philadelphia, Pa.
selin-Jefferson Co., New York, N.Y. $2,-22,345. 4,188,822 yards of fireproof otton oxford cloth. Defense Personnel upport Center, Philadelphia, Pa.
restex, Inc., New York, N.Y. $5,974,257.),476,500 yards of fireproof cotton oxford oth. Defense Personnel Support Center, hiladelphia, Pa.
renton Textile Engineering & Mfg. Co., renton, N.J. $1,636,396. 167,740 men's wet eather parkas. Defense Personnel Support enter, Philadelphia, Pa.
eneral Cable Corp., New York, N.Y. $1,-18,642. 21,800 reels of telephone cable. Defense Industrial Supply Center, Philadelhia, Pa.
tlantic Richfield Co., Philadelphia, Pa. 1,839,279 Fuel oil & gasoline. Defense uel Supply Center, Alexandria, Va.
aura Industries, Selma, Ala. $1,230,380. 16,840 men's cotton and nylon raincoats. efense Personnel Support Center, Philadelphia, Pa.
naka Co., Greeneville, Tenn., $1,781,565. 711,067 cases on individual combat meals. efense Personnel Support Center, Philadelphia, Pa.
renton Textile Engineering & Mfg. Co., renton, N.J. $1,099,140. 594,880 waterroof clothing bags. Defense Personnel upport Center, Philadelphia, Pa.
restex, Inc., New York, N.Y. $1,402,730. 1,000 yards of cotton and nylon duck oth. Defense Personnel Support Center, hiladelphia, Pa.
aiser Steel Corp., Oakland, Calif. $7,956,-5. 36,150 bundles of steel landing mats. efense Construction Supply Center, Columbus, Ohio.
C.A., Harrison, N.J. $1,302,500. Electron ansmitting tubes. Harrison. Defense Electronic Supply Center, Dayton, Ohio.
&W Fine Foods, San Francisco, Calif. $1,-7,110. 2,183,712 lbs. of roasted ground coffee. Defense Personnel Support Center, Philadelphia, Pa.

25—Allen Overall Co., Monroe, N.C. $1,537,346. 173,908 pairs of men's wet weather overalls. Defense Personnel Support Center, Philadelphia, Pa.

27—American Air Filter Co., St. Louis, Mo. $1,629,630. 953 portable electric flood light sets. Defense General Supply Center, Richmond, Va.

28—Wilson Mfg. Co., Wilson, N.C. $3,475,504. 17,994 medium general purpose tents with covers. Defense Personnel Support Center, Philadelphia, Pa.
—VA. Tent & Awning Co., Norfolk, Va. $2,-234,850. 9,510 medium general purpose tents with covers. Defense Personnel Support Center, Philadelphia, Pa.

CONTRACT LEGEND

ntract information is listed in e following sequence: Date—mpany—Value—Material or ork to be Performed—Location of Work Performed—Contracting Agency.

ARMY

3—Computer Sciences Corp., Silver Spring, Md. $1,625,325. Formulation of an Automatic Data Processing program, including formal training. Silver Spring. Army Electronics Command, Fort Monmouth, N.J.

4—L. E. Mason Co., Boston, Mass. $1,253,522. Fuzes for 60mm ammunition. Hyde Park, Mass. Ammunition Procurement & Supply Agency, Joliet, Ill.

5—Dynamics Corp. of America, Bridgeport, Conn. $1,232,578. Repair parts for 60-cycle generator sets. Bridgeport. Army Mobility Equipment Command, St. Louis, Mo.
—Bell Aerospace Corp., Fort Worth, Tex. $2,248,565. AH-1G helicopters for qualification testing. Fort Worth. Army Aviation Materiel Command, St. Louis, Mo.

6—Eltra Corp., Toledo, Ohio. $1,613,723. Generators for ¼-ton, ¾-ton and 2½-ton trucks. Bay City, Mich. Army Tank Automotive Command, Warren, Mich.
—General Motors, Detroit, Mich. $1,914,027. Generators for ¼-ton, ¾-ton and 2½-ton trucks. Anderson, Ind. Army Tank Automotive Command, Warren, Mich.
—Sornsin Construction Co., Fargo, N.D. $1,-090,402. Work on the muscatine Island Levee District and Muscatine-Louisa County Drainage District #13 project. Muscatine, Iowa. Engineer Dist., Rock Island, Ill.
—Raber-Kief, Inc., and Beck Constructors, Seattle, Wash. $1,269,287. Maintenance of runways and taxiways at Shemya AFB, Alaska. Engineer Dist., Anchorage, Alaska.
—R. G. LeTourneau, Inc., Longview, Tex. $3,751,320. Metal parts for 750-lb. bombs. Longview. Ammunition Procurement & Supply Agency, Joliet, Ill.

7—Okaw Industries, Torrance, Calif. $1,228,-385. Reinforced plastic containers for storage and transport of equipment to the field. Calexico, Calif. Army Aviation Materiel Command, St. Louis, Mo.
—Bell Aerospace Corp., Fort Worth, Tex. $3,-017,172. UH-1 helicopter main blade assemblies, $1,268,797. Rotary wing blades. $3,-687,739. Main rotor hubs. $8,275,920. Rotary wing blades. Fort Worth. Army Aviation Materiel Command, St. Louis, Mo.
—Raytheon Co., Lexington, Mass. $3,503,322. Initial production run of self propelled Hawk missile system ground support equipment. Andover, Mass. and Bristol, Tenn. Army Missile Command, Andover, Mass.
—J. W. Bateson, Inc., Dallas, Tex. $8,069,450. Construction of seven enlisted men's barracks complexes at Fort Gordon, Ga. Engineer Dist., Savannah, Ga.
—Eugene Luhr & Co., Columbia, Ill. $3,223,-870. Work on the Arkansas River and Tributaries, Arkansas and Oklahoma Project. Inola, Okla. Engineer Dist., Tulsa, Okla.
—Penker Construction Co., Cincinnati, Ohio. $4,614,213. Work on the Saylorville Dam and Reservoir, Des Moines River, Iowa Project. Polk City, Iowa. Engineer Dist., Rock Island, Ill.
—Wetmore & Parman, Inc., Jackson, Miss. $2,059,627. Construction work on the Waterways Experiment Station, Vicksburg, Miss., Project. Engineer Dist., Vicksburg, Miss.
—Peter Kiewit Sons' Co., Vancouver, Wash. $4,371,626. Work on the Lower Monumental Lock & Dam, Washington Project. Sargent, Wash. Engineer Dist., Seattle, Wash.
—International Harvester Co., Chicago, I $3,658,272. Trucks. Fort Wayne, Ind., S Leandro, Calif., and Woodbridge, N Army Tank Automotive Command, Warr Mich.

10—Cadillac Gage Co., Warren, Mich. $1,45 000. Armored cars. Warren. Army Ta Automotive Command, Warren, Mich.
—Raytheon Co., Lexington, Mass. $2,915,7(Selected items of ground support equ: ment and field maintenance equipment f the Hawk missile system. Andover, Ma and Waltham, Mass. Army Missile Co: mand, Andover, Mass.
—Levinson Steel Co., Pittsburgh, Pa. $2,41 000. Plant reactivation for the producti of metal parts for 105mm shells. Pitt burgh. Ammunition Procurement & Supp Agency, Joliet, Ill.

11—Leece Neville Co., Cleveland, Ohio. $1,16(315. Starters for 2½- and 5-ton truc] Cleveland. Army Tank Automotive Co: mand, Warren, Mich.
—Eltra Corp., Toledo, Ohio. $1,099,1] Starters for 2½- and 5-ton trucks. B: City, Mich. Army Tank Automotive Co: mand, Warren, Mich.
—General Motors, Detroit, Mich. $1,270,6? Starters for 2½- and 5-ton trucks. Ande son, Ind. Army Tank Automotive Co: mand, Warren, Mich.
—Day & Zimmermann, Inc., Philadelphi Pa. $2,238,120. Loading, assembling a packing miscellaneous fuzes, boosters, p: mers and detonators. Texarkana, Tex. A: munition Procurement & Supply Agenc Joliet, Ill.
—Atlas Chemical Industries, Wilmingto Del. $1,041,846. TNT and operations a: maintenance activities. Chattanooga, Ten Ammunition Procurement & Supp Agency, Joliet, Ill.
—Farell Construction Co., Memphis, Ten $1,518,366. Work on the Cordell Hull Lo(and Dam Project. Carthage, Tenn. Eng neer Dist., Nashville, Tenn.
—M. M. Sundt, Tucson, Ariz. $1,094,000. Co: struction of a base communications buil ing; a basic flight training facility; a ge: eral purpose shop and a vehicle refuelin shop at Williams AFB Ariz. Engine Dist., Los Angeles, Calif.

12—Union Carbide Corp., New York, N.Y. $3 982,123 and $3,710,472. Dry batterie Charlotte, N.C. Army Electronics Con mand, Philadelphia, Pa.
—Burgess Battery Co., Freeport, Ill. $1,566 248 and $1,172,928. Dry batteries. Fre port. Army Electronics Command, Phil delphia, Pa.
—Marathon Battery Co., Wausau, Wis. $1 261,872. Dry batteries. Wausau. Army Ele tronics Command, Philadelphia, Pa.
—Hughes Tool Co., Culver City, Calif. $2 065,450. Helicopter armament subsystem: Culver City. Army Weapons Comman Redstone Arsenal, Huntsville, Ala.
—Levinson Steel Co., Pittsburgh, Pa. $10 425,675. Metal parts for 105mm projectile: Pittsburgh. Ammunition Procurement Supply Agency, Joliet, Ill.
—Chamberlain Corp., Waterloo, Iowa. $2 476,387. 155mm smoke projectiles. Scrar ton, Pa. Ammunition Procurement & Su ply Agency, Joliet, Ill.
—International Harvester Corp., Melros Park, Ill. $2,030,000. Scoop type loader: Libertyville, Ill. Army Mobility Equi: ment Command, St. Louis, Mo.

13—Westinghouse Air Brake Co., Peoria, Il $1,104,629. Motorized road graders. Indian apolis, Ind. Army Mobility Equipmen Command, St. Louis, Mo.
—King Construction Co. Texarkana, Te: $1,769,670. Work on the DeQueen Diamon Reservoir, Arkansas Project. DeQueer Ark. Engineer Dist., Tulsa, Okla.
—U.S. Steel Corp., Baltimore, Md. $1,062, 995. 18 armor plate line items to be use for ammunition testing. Munhall, P: Aberdeen Proving Ground, Md.
—Standard Dredging Corp., New Orleans La. $1,310,132. Work on the Mississipp River and Tributaries Flood Control-Chan nel Improvement Project. Work will b done on the reach from Loosahatchie t Memphis, Tenn., and at Island 63 nea

Clarksville, Miss. Engineer Dist., Memphis, Tenn.

—**Foster Construction Co.**, Balboa, Canal Zone. $1,140,000. Construction of an air freight terminal, chapel annex, air passenger terminal, recreation gym, and NCO Open Mess alterations at Howard AFB, Canal Zone. Engineer Dist., Jacksonville, Fla.

—**K D I Corp.**, Cincinnati, Ohio. $2,077,351. Metal parts for 2.75-inch rocket fuzes. Cincinnati. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Raytheon Co.**, Lexington, Mass. $6,199,148. Advanced production engineering for the improved Hawk missile system. Andover, Mass. Army Missile Command, Andover, Mass.

—**Raytheon Co.**, Lexington, Mass. $1,807,675. Improved Hawk factory testing equipment and gauging. Andover, Mass. Army Missile Command, Andover, Mass.

14—**Kennedy Van Saun Corp.**, Danville, Pa. $1,151,900. Metal parts for PP–T105mm projectiles. Danville. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**American Machine & Foundry Co.**, Brooklyn, N.Y. $9,120,211. Metal parts for 750-lb. bombs. Garden City, N.Y. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**L. T. Industries**, Garland, Tex. $2,406,967. Assemblies for the 750-lb. bomb. Garland. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**R. G. LeTourneau**, Longview, Tex. $2,303,-616. Fin assemblies for the 750-lb. bomb. Longview. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**U.S. Rubber Co.**, New York, N.Y. $14,834,-417. Loading, assembling and packing ammunition components; manufacturing explosives; and Operations & Maintenance Activities. Joliet, Ill. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Thiokol Chemical Corp.**, Bristol, Pa. $12,-210,753. Loading, assembling and packing miscellaneous shells; loading rocket motors; and Operations and Maintenance Activities. Marshall, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Olin Mathieson Chemical Corp.**, East Alton, Ill. $2,091,508. Grenade fuzes. New Brighton, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Honeywell, Inc.**, Hopkins, Minn. $4,519,-999. Grenade fuzes. New Brighton, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Lear Siegler, Inc.**, Anaheim, Calif. $2,227,-784. Artillery ammunition boosters. Anaheim. Procurement Detachment, New York, N.Y.

—**Emco Porcelain Enamel Co.**, Port Chester, N.Y. $2,020,000. Ammunition boxes. Port Chester. Frankford Arsenal, Philadelphia, Pa.

—**V&N Construction Co.**, Lubbock, Tex. $1,-247,500. Construction of a hospital barracks complex at Fort Hood, Tex. Engineer Dist., Fort Worth, Tex.

—**Loadcraft, Inc.**, Denton, Tex. $1,083,147. Semi-trailer wreckers. Augusta, Kan. Army Tank Automotive Command, Warren, Mich.

—**Bowen-McLaughlin, Inc.**, York, Pa. $16,-772,847. Retrofit of M48A3 and M48A4 tanks. York. Army Weapons Command, Rock Island, Ill.

17—**Chaney & James Construction Co.**, Richardson, Tex. $2,148,000. Construction of a 1,000-man, three storied dormitory at Sheppard AFB, Tex. Engineer Dist., Albuquerque, N.M.

18—**John Wood Co.**, St. Paul, Minn. $2,049,082. Fin assemblies for 750-lb. bombs. St. Paul. Ammunition Procurement & Supply Joliet, Ill.

—**Ford Construction Co.**, Dyersburg, Tenn. $2,088,440. Work on the East Atchafalaya Levee Project. Near Pierre Pass, La. Engineer Dist., New Orleans, La.

—**McGinnes Bros.**, Houston, Tex. $1,065,105. Work on the Texas City, Tex., Hurricane Protection Project. Engineer Dist., Galveston, Tex.

—**Otis Elevator Co.**, Brooklyn, N.Y. $1,704,-259. 75 semi-trailer vans to house teletype relay facilities. Brooklyn. Army Electronics Command, Philadelphia, Pa.

—**Hol-Gar Mfg. Co.**, Primos, Pa. $1,520,031. 400-cycle diesel generators and spare parts. Primos. Engineer Research Laboratory, Fort Belvoir, Va.

—**Beech Aircraft Corp.**, Wichita, Kan. $7,-833,468. U-21A utility aircraft and related data. Wichita. Army Aviation Materiel Command, St. Louis, Mo.

19—**LTV Electro Systems**, Greenville, Tex. $1,-231,410. Work on a classified project. Greenville. Army Security Agency, Arlington, Va.

—**Westinghouse Air Brake Co.**, Peoria, Ill. $3,088,567. 210 diesel road graders. Peoria. Army Mobility Equipment Command, St. Louis, Mo.

—**General Motors**, Indianapolis, Ind. $2,559,-900. Breech mechanism assemblies for 152mm gun/launchers (M81). Indianapolis. Watervliet Arsenal, N.Y.

—**R.C.A.**, Camden, N.J. $1,000,000. Classified electronic equipment. Camden. Army Electronics Command, Fort Monmouth, N.J.

—**Philco Ford Corp.**, Newport Beach, Calif. $1,491,208. Various quantities of Shillelagh spare parts. Newport Beach. Northwest Procurement Agency, Oakland, Calif.

—**Boyd & Goforth**, Charlotte, N.C., $1,299,-074. Construction of post engineer facilities. Fort Bragg, N.C. Engineer Dist., Savannah, Ga.

—**D. R. Allen & Sons**, Fayetteville, N.C. $1,-178,926. Construction of four administration and storage buildings, one equipment shop and one electronic maintenance shop at Fort Bragg, N.C. Engineer Dist., Savannah, Ga.

20—**Thompson Construction Co.**, Albany, N.Y. $1,537,379. Construction of an industrial liquid waste treatment plant at Watervliet Arsenal, N.Y. Engineer Dist., New York, N.Y.

—**General Dynamics**, Rochester, N.Y. $15,-300,000. Reconfiguration of various digital subscriber terminal telephone system equipment (AUTODIN Program). Rochester. Army Electronics Command, Fort Monmouth, N.J.

21—**Vinnell Corp.**, Alhambra, Calif. $3,099,553. Installation and operation of an equipment reconditioning facility in South Vietnam. Army Mobility Equipment Command, St. Louis, Mo.

—**Great Lakes Dredge & Dock Co.**, New York, N.Y. $1,242,342. Work on the Little Neck Bay Project. Little Neck Bay, N.Y. Engineer Dist., New York, N.Y.

—**Baltimore Contractors, Inc.**, Baltimore, Md. $7,096,000. Construction of a medical biological research laboratory building at Fort Deterick, Md. Engineer Dist., Baltimore, Md.

—**Stewart Warner Corp.**, Lebanon, Ind. $2,-897,550. Metal parts for 60mm projectiles. Lebanon. Ammunition Procurement & Supply Agency, Joliet, Ill.

24—**Albion Malleable Co.**, Albion, Mich. $2,-989,800. Projectile body and band assemblies for 81mm explosives. Albion. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**General Dynamics**, Rochester, N.Y. $3,-570,852. Radio sets. Rochester. Army Electronics Command, Philadelphia, Pa.

—**Caterpillar Tractor Co.**, Peoria, Ill. $4,053,-050. Tractors. Peoria. Army Mobility Equipment Command, St. Louis, Mo.

—**Martin Zachry Constructors**, Honolulu, Hawaii. $16,899,915. Construction of a multi-functional array radar building at Kwajalein Atoll. Engineer Dist., Honolulu, Hawaii.

25—**Menominee, Engineering Corp.**, Menominee, Mich. $1,555,390. Bridge components. Menominee. Army Mobility Equipment Command, St. Louis, Mo.

—**Bulova Watch Co.**, Providence, R.I., $2,-806,210. Head assemblies for M525 fuzes. Providence. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**FMC Corp.**, San Jose, Calif. $3,547,892. M113A1 armored personnel carriers. South Charleston, W. Va. Army Tank Automotive Command, Warren, Mich.

26—**Ryan Contracting Co.**, Evansville, Ind. $1,-401,506. Construction of flood protection components. Sturgis, Ky. Engineer Dist., Louisville, Ky.

—**Philco-Ford Corp.**, Newport Beach, Calif. $2,571,460. Repair procedures, test equipment and establishment and operation of a repair facility for the Shillelagh missile at the Army Depot, Anniston, Ala. Army Missile Command, Redstone Arsenal, Huntsville, Ala.

—**Hughes Aircraft**, Culver City, Calif. $1, 740,000. Thermal night sights plus the engineering procurement data package for the TOW missile. Culver City. Research and Development Laboratories, Fort Belvoir, Va.

—**Whittenberg Engineering & Construction Co.**, Louisville, Ky. $11,416,111. Construction of troop housing and supporting facilities at Fort Knox, Ky. Engineer Dist., Louisville, Ky.

—**General Motors**, Indianapolis, Ind. $4,872,-479. Sheridan tank transmissions. Indianapolis. Army Tank Automotive Command, Warren, Mich.

—**Poloron Products**, New Rochelle, N.Y. $1,-533,129. Fin assemblies for the 750-lb. bomb. Scranton, Pa. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Magnovox Co.**, Fort Wayne, Ind. $6,160,-671. Radio sets. Fort Wayne. Army Electronics Command, Philadelphia, Pa.

27—**Northrop Corp.**, Newbury Park, Calif. $2,-354,400. Target guided missiles. Newbury Park. Army Missile Command, Redstone Arsenal, Huntsville, Ala.

—**H. Halvorson, Inc.**, Spokane, Wash. $1,-009,852. Construction of a shopping center and 31 houses with curbs, drives, walks, and parking areas, and for replacing water and gas lines. Fort Peck Dam, Montana. Engineer Dist., Omaha, Neb.

—**R. G. LeTourneau, Inc.**, Longview, Tex. $9,710,519. Metal parts for 750-lb. bombs. Longview. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Pace Corp.**, Memphis, Tenn. $1,249,560. Illuminating signals for ground operations. Memphis. Ammunition Procurement & Supply Agency, Joliet, Ill.

28—**Peter Kiewit Son Co.**, Seattle Wash. $4,-433,022. Construction of a multi-purpose, multi-story reinforced concrete structure at Tin City, Alaska. Engineer Dist., Anchorage, Alaska.

—**Eureka Williams Co.**, Bloomington, Ill. $1,-451,263. Metal parts for bomb fuzes. Bloomington. Procurement Detachment, Chicago, Ill.

—**Collins Radio Co.**, Richardson, Tex. $4,613,-491. AN/TRC–129 radio terminal sets. Richardson. Procurement Detachment, Chicago, Ill.

—**Jahncke Service, Inc.**, New Orleans, La. $1,423,964. Lease of a pipeline dredge and attendant plant for channel improvement and maintenance dredging along the Missisippi River from Columbus, Ky. to Vicksburg, Miss. Engineer Dist., Memphis, Tenn.

—**United Aircraft**, Windsor Locks, Conn. $1,-712,545. Propeller systems for OV–1 (Mohawk) helicopters. Windsor Locks. Army Aviation Materiel Command, St. Louis, Mo.

—**Beech Aircraft**, Wichita, Kan. $5,000,000. U–21A utility aircraft. Wichita. Army Aviation Materiel Command, St. Louis, Mo.

—**Dynamics Corp. of America**, Bridgeport, Conn. $1,233,696. Generator sets. Bridgeport. Army Mobility Equipment Command, St. Louis, Mo.

—**Iowa Mfg. Co.**, Cedar Rapids, Iowa. $1,-620,711. Crushing and screening plants. Cedar Rapids. Army Mobility Equipment Command, St. Louis, Mo.

—**Zeller Corp.**, Defiance, Ohio. $1,902,773. Metal parts for 20-mm projectiles. Defiance. Frankford Arsenal, Philadelphia, Pa.

—**Harvey Aluminum Co.**, Torrance, Calif. $1,975,000. Metal parts for 20mm projectiles. Torrance. Frankford Arsenal, Philadelphia, Pa.

—**Washington University**, St. Louis, Mo. $1,-000,000. Research in macromodular computer systems. St. Louis. Defense Supply Service, Washington, D. C.

—**Radalab**, Westbury, N.Y. $5,310,500. Terminal telephones. Westbury. Army Electronics Command, Philadelphia, Pa.

—**R.C.A.**, Camden, N.J. $4,094,745. Radio sets and receivers. Camden. Army Electronics Command, Philadelphia, Pa.

—**AVCO Corp.**, Cincinnati, Ohio. $1,738,529. Antennae. Cincinnati. Army Electronics Command, Philadelphia, Pa.

—**Collins Radio Co.**, Dallas, Tex. $2,495,000. A high frequency communication system consisting of four HV radio stations and spare parts. Dallas. Army Electronics Command, Philadelphia, Pa.

—**SMC Corp.**, Deerfield, Ill. $2,365,042. Teletypewriter sets. Deerfield. Army Electronics Command, Philadelphia, Pa.

—**Raytheon Co.**, Norwood, Mass. $4,462,135. Code modulation equipment. North Dighton, Mass. Army Electronics Command, Philadelphia, Pa.

—**Fontaine Truck Equipment Co.**, Birmingham, Ala. $2,225,507. 25-ton semi-trailers. Haleyville, Ala. Army Tank Automotive Command, Warren, Mich.

—**Hupp Corp.**, Canton, Ohio. $2,585,115. 2½-ton truck engine assemblies. Canton. Army Tank Automotive Command, Warren, Mich.

—**Continental Motors**, Muskegon, Mich. $7,-129,211. M48 and M60 tank engine assemblies. Muskegon. Army Tank Automotive Command, Warren, Mich.

—**General Motors**, Indianapolis, Ind. $1,352,-

128. Transmissions for the 175mm self propelled gun, the eight-inch howitzer, and the armored recovery vehicle. Indianapolis. Army Tank Automotive Command, Warren, Mich.

—**Firestone Tire & Rubber Co.**, Akron, Ohio. $1,590,688. Maintenance and support services, and movement of Government equipment and property from Lordstown, Pa., to the Ammunition Plant, Ravenna, Ohio. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**U.S. Rubber Co.**, New York, N.Y. $20,493,-397. Explosives, ordnance components and Operations and Maintenance Activities at the Ammunition Plant, Joliet. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Hercules, Inc.**, Wilmington, Del. $1,371,434. Manufacture of miscellaneous propellants and explosives and Operations and Maintenance Activities at the Ammunition Plant, Radford, Va. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**General Motors**, Detroit, Mich. $4,799,250. Body and band assemblies for 81mm projectiles. Warren Mich. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Northrop Corp.**, Needham Heights, Mass. $1,611,869. Fin assemblies for 81mm mortars. Needham Heights. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Raytheon Co.**, Lexington, Mass. $1,968,000. Metal parts for 750-lb. bomb fuzes. Bristol, Tenn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**General Instrument Corp.**, Chicopee, Mass. $1,915,452. Metal parts for 750-lb. bomb fuzes. Chicopee. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Chamberlain Corp.**, Waterloo, Iowa. $4,-976,600. Metal parts for 175mm projectiles. Scranton, Pa. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Honeywell, Inc.**, Hopkins, Minn. $2,031,120. 750-lb. bomb nose fuzes. Twin Cities Army Ammunition Plant, New Brighton, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Amron, Corp.**, Waukesha, Wis. $1,526,022. 40mm cartridge cases. Waukesha. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Norris Industries**, Los Angeles, Calif. $7,-950,000. 105mm cartridge cases. Riverbank, Calif. Ammunition Procurement & Supply Agency, Joliet, Ill.

NAVY

3—**Raytheon Co.**, Lexington, Mass. $18,059,-480. Sparrow III guided missiles and related equipment. Lowell, Mass. Naval Air Systems Command.

—**Northrop Corp.**, Newbury Park, Calif. $5,-361,000. MQM-74A target drones. Newbury Park. Naval Air Systems Command.

—**Data Products Corp.**, Culver City, Calif. $1,342,948. High-speed line printers for ship computer systems. Culver City. Naval Ship Systems Command.

4—**Litton Systems, Inc.**, Van Nuys, Calif. $51,500,000. Air operation centrals, huts, radar modification kits and repair parts for use with the Marine Corps Tactical Data System. Van Nuys. Naval Ship Systems Command.

—**North American Aviation**, Columbus, Ohio. $5,700,000. RA-5C aircraft. Columbus. Naval Air Systems Command.

—**Sperry-Farragut Co.**, Bristol, Tenn. $1,105,-701. Missile guidance and control sections, and wing and fin sets for Shrike missiles. Bristol, Naval Air Systems Command.

—**Rlha Construction Co.**, La Mesa, Calif. $1,-042,384. Construction of barracks at the Fleet Anti-Submarine Warfare School in San Diego, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif.

5—**North American Aviation**, Anaheim, Calif. $1,671,500. Components for Ships Inertial Navigation Systems. Anaheim. Naval Ship Systems Command.

—**Hydranamic Systems Corp.**, Kent, Wash. $1,110,920. Mark VII arresting engines, with repair parts, for use on aircraft carriers. Kent. Naval Engineering Center, Philadelphia, Pa.

—**Del Guzzi Construction Co.**, Port Angeles, Wash. $1,032,533. Construction of a torpedo shop at the Naval Torpedo Station, Keyport, Wash. Northwest Div., Naval Facilities Engineering Command, Seattle, Wash.

—**Jordan Co.**, Suisun City, Calif. $2,708,000. Construction of recruit barracks at the Naval Training Center, San Diego, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif.

—**Balfield Industries**, Dallas, Tex. $5,289,885. Bomb fins for 500-lb. bombs. Scranton, Pa. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**Poloron Products**, New Rochelle, N.Y. $2,-477,025. Bomb fins for 500-lb. bombs. Scranton, Pa. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**Metals Engineering Co.**, Greeneville, Tenn. $1,986,474. Bomb fins for 500-lb. bombs. Greeneville. Navy Ships Parts Control Center, Mechanicsburg, Pa.

6—**Western Electric**, New York, N.Y. $2,400,-000. Research and development on passive acoustic sonar for aircraft. Winston-Salem, N.C. Naval Air Systems Command.

—**United Aircraft**, Stratford, Conn. $3,621,-857. HH-53B helicopters for the Air Force. Stratford. Naval Air Systems Command.

—**United Boatbuilders**, Bellingham, Wash. $3,778,720. 80 river patrol boats. Bellingham. Naval Ship Systems Command.

7—**Maxson Electronics Corp.**, Old Forge, Pa. $1,800,000. To increase the limitation of authorization for Bullpup guided missiles. Old Forge. Naval Air Systems Command.

—**Lockheed Missiles & Space Co.**, Sunnyvale, Calif. $3,919,816. Tactical engineering services on the Polaris missile system. Sunnyvale. Special Projects Office.

—**General Electric**, Binghampton, N.Y. $1,-909,477. ASA-32 automatic flight control systems and related equipment for the Air Force. Johnson City, N.Y. Naval Air Systems Command.

—**Goodyear Aerospace Corp.**, Akron, Ohio. $4,503,727. Subroc. Akron. Naval Ordnance Systems Command.

—**Martin Marietta**, Baltimore, Md. $1,500,-000. Classified work on Navy aircraft. Baltimore. Naval Air Systems Command.

10—**Hughes Aircraft Co.**, Culver City, Calif. $2,799,300. Design and fabrication of a multi-function radar antenna and related services and equipment. Culver City. Naval Air Systems Command.

—**Sperry Rand Corp.**, Syosset, N.Y. $1,911,-000. Inertial navigation subsystem components for nuclear-powered fleet ballistic missile submarines. Syosset. Naval Ship Systems Command.

—**W. H. Belanga & Associates**, Norfolk, Va. $2,413,425. Rehabilitation of barracks and mess halls at the Naval Air Station, Norfolk, Va. Atlantic Div., Naval Facilities Engineering Command, Norfolk, Va.

11—**EFMC Corp.**, Los Angeles, Calif. $1,278,-366. Mark 19, MOD 1, plastic weather shields for 3-inch, 50-caliber twin gun mounts. Los Angeles. Naval Ordnance Station, Louisville, Ky.

—**Electromagnetic Technology Corp.**, Colmar, Pa. $1,648,720. Transistorized electron counters. Colmar. Naval Ship Systems Command.

—**Sperry Rand Corp.**, Charlottesville, Va. $3,085,003. Periscopes, adapter systems, hoist yokes, engineering services and repair parts. Charlottesville. Naval Ship Systems Command.

—**Collins Radio Co.**, Richardson, Tex. $7,-000,000. VLF airborne communications systems and related equipment for installation in C-130 aircraft. Richardson. Naval Air Systems Command.

12—**General Dynamics**, Pomona, Calif. $2,324,-400. Increase the limitation of authorization for material and assemblies for the Standard ARM missile. Pomona. Naval Air Systems Command.

—**Whittaker Corp.**, Denver, Colo. $1,500,000. Production of MK 46 batteries. Denver. Naval Ordnance Systems Command.

—**Yardney Electric Co.**, New York, N.Y. $1,-404,540. MK 53 batteries. Denver, Colo. Naval Ordnance Systems Command.

—**North American Aviation**, McGregor, Tex. $1,144,640. MK 39 rocket motors and related equipment. McGregor. Naval Air Systems Command.

—**Jordan Co.**, Suisun City, Calif. $1,619,000. Construction of barracks at the Naval Air Station, North Island, San Diego, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif.

13—**Sperry Rand Corp.**, Great Neck, N.Y. $2,-000,000. Production of MK 66 signal data converters for the Talos missile. Great Neck. Naval Ordnance Systems Command.

—**Hubbard Construction Co.**, Orlando, Fla. $1,206,800. Installation of utilities and for a drill field at the Naval Training Center, Orlando, Fla. Southeast Div., Naval Facilities Engineering Command, Charleston, S.C.

—**Jefferson Construction Co.**, Cambridge, Mass. $2,103,000. Construction of a bachelor officer's quarters at the Naval Station, Newport, R.I. Northeast Div., Naval Facilities Engineering Command, Boston, Mass.

—**ITT Federal Laboratories**, Nutley, N.J. $5,-450,000. Classified electronics equipment. Nutley. Naval Ship Systems Command.

—**Sylvania Electric Products**, Waltham, Mass. $1,925,000. Airborne receiver transmitter radio sets and related equipment. Waltham. Naval Air Systems Command.

14—**Garrett Corp.**, Los Angeles, Calif. $1,015,-464. Compressor power units and related equipment. Torrance, Calif. Naval Air Systems Command.

—**Northrop Corp.**, Newbury Park, Calif. $2,-694,700. Two anti-submarine classification analysis centers. Naval Air Development Center, Johnsville, Pa.

—**Norris Industries**, Los Angeles, Calif. $15,066,000. 500-lb. MK 82 bomb bodies. Vernon, Calif. Navy Ships Parts Control Center, Mechanicsburg, Pa.

17—**Austin-Wright Construction Co.**, Oklahoma City, Okla. $2,955,000. Rehabilitation of barracks at the Marine Corps Air Station, Cherry Point, N.C. Atlantic Div., Naval Facilities Engineering Command, Norfolk, Va.

—**P. H. Lusardi Construction Co.**, Vista, Calif. $1,974,500. Construction of a battalion vehicle maintenance shop, administration building, supply operations building, battalion recreation building and a regimental administration building at Camp Pendleton, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif.

—**P. H. Lusardi Construction Co.**, Vista, Calif. $1,274,000. Construction of a base headquarters division area at Camp Pendleton, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif.

—**McDonnell Co.**, St. Louis, Mo. $1,200,203. Work on F-4 aircraft. St. Louis. Naval Air Systems Command.

18—**Grumman Aircraft Engineering Corp.**, Bethpage, N.Y. $30,600,000. A-6A aircraft. Bethpage. Naval Air Systems Command.

—**Northrop Corp.**, Newbury Park, Calif. $2,-100,000. Design, development, fabrication, testing and furnishing of an overall mobile anti-submarine warfare target system. Newbury Park. Naval Ordnance Systems Command.

—**American Mfg. Co of Tex.**, Fort Worth, Tex. $1,569,812. Projectiles for 5-inch 54-cal. guns. Fort Worth. Navy Ships Parts Control Center, Mechanicsburg, Pa.

19—**Todd Shipyards**, New Orleans, La. $2,072,-000. Repair of hull, machinery, electrical and miscellaneous damage to drydock AFDM-2. New Orleans. Supervisor of Shipbuilding, Eighth Naval Dist., New Orleans, La.

—**Wells Industries**, North Hollywood, Calif. $1,276,580. Ground support equipment for starting jet engine aircraft. North Hollywood. Naval Air Systems Command.

20—**Boeing Co.**, Morton, Pa. $10,241,103. CH-46D helicopters. Morton. Naval Air Systems Command.

—**Johns Hopkins University, Applied Physics Laboratory**, Silver Spring, Md. $2,642,000. Research and development on the Bumblebee project. Silver Spring. Naval Ordnance Systems Command.

—**Curtiss Wright Corp.**, Wood-Ridge, N.J. $1,799,996. Compressor blades for J-65 engines. Wood-Ridge. Navy Aviation Supply Office, Philadelphia, Pa.

—**Gretna Machine & Iron Works**, Harvey, La. $1,298,000. Five fuel oil barges. Harvey. Naval Ship Systems Command.

21—**Bendix Corp.**, Baltimore, Md. $9,183,201. Airborne radio receiver transmitter sets and related equipment. Baltimore. Naval Air Systems Command.

—**Honeywell, Inc.**, Hopkins, Minn. $2,909,700. Fabrication of components for the Rockeye II weapon system. Hopkins. Navy Purchasing Office, Los Angeles, Calif.

24—**Clevite Corp.**, Cleveland, Ohio. $2,500,000. Research and development of a new torpedo test vehicle. Cleveland. Naval Ordnance Systems Command.

—**Douglas Aircraft Co.**, Long Beach, Calif. $20,628,000. Additional funding for A4F aircraft. Long Beach. Naval Air Systems Command.

—**H. R. Beebe, Inc.**, Utica, N.Y. $1,236,520. Conversion of an electronic research laboratory at Griffiss AFB, N.Y. Eastern Div., Naval Facilities Engineering Command, New York, N.Y.

25—**General Dynamics**, Quincy, Mass. $23,848,-

000. Construction of a dock landing ship. Quincy. Naval Ship Systems Command.

—Steel Cot Corp., Birmingham, Ala. $1,574,804. Mark 9 ammunition pallets. Birmingham. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—United Aircraft, East Hartford, Conn. $2,781,912. Spare parts for fighter aircraft engines. East Hartford. Navy Aviation Supply Office, Philadelphia, Pa.

—Maxson Electronics Corp., Macon, Ga. $1,203,304. 5-inch, 54-cal. projectile fuzes. Macon. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—Western Electric, New York, N.Y. $10,115,000. Oceanographic research. Overseas. Navy Purchasing Office, Washington, D.C.

—American Machine & Foundry Co., York, Pa. $10,887,000. Mark 82, MOD 1, 500-lb. bomb bodies. York. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—General Dynamics, Pomona, Calif. $2,830,000. Manufacture, assemble and check out guidance and control components for improved Tartar and HT-3A Terrier missiles and related equipment. Pomona. Naval Ordnance Systems Command.

—Paul J. Vagnoni, North Hills, Pa. $1,300,000. Construction of enlisted men's barracks at the Naval Station, Philadelphia, Pa. East Central Div., Naval Facilities Engineering Command, Philadelphia, Pa.

—D. Geyer Construction, Monterey, Calif. $1,624,000. Construction of additional academic facilities at the Naval Post Graduate School, Monterey, Calif. Western Div., Naval Facilities Engineering Command, San Bruno, Calif.

26—Stromberg Carlson, San Diego, Calif. $1,686,500. Airborne tactical data display systems for ASW aircraft. San Diego. Naval Air Systems Command.

—Sanders Associates, Nashua, N.H. $3,000,000. Basic engineering and development of an air droppable ASW sonobuoy system. Nashua. Naval Air Systems Command.

—Sperry Rand Corp., Syosset, N.Y. $3,388,000. Intertial navigation subsystem components. Syosset. Naval Ship Systems Command.

—Lockheed Missile & Space Co., Sunnyvale, Calif. $50,838,766. Polaris A-3 missiles. Sunnyvale. Special Projects Office.

27—Westinghouse Electric, Baltimore, Md. $1,200,000. Airborne radar sets. Baltimore. Naval Air Systems Command.

—United Aircraft, East Hartford, Conn. $1,149,163. Incremental funding for J60-P-6 engines. East Hartford. Naval Air Systems Command.

—Lockheed Aircraft, Burbank, Calif. $5,584,349. Extension of long lead time effort to support FY 1967 procurement of P3B aircraft. Naval Air Systems Command.

—Todd Shipyards, San Pedro, Calif. $1,039,515. Regular overhaul of the oiler USS Tolovana (AO-64). San Pedro. Supervisor of Shipbuilding, Eleventh Naval Dist., San Diego, Calif.

—American Mfg. Co. of Tex., Fort Worth, Tex. $21,358,560. Mark 82 bodies for 500-lb. bombs. Fort Worth. Navy Ships Parts Control Center, Mechanicsburg, Pa.

28—Parker Aircraft, Los Angeles, Calif. $1,318,398. Fueling-at-sea probes and receivers. Los Angeles. Naval Ship Systems Command.

—Owen L. Schwam Construction Co., Newton Highlands, Mass. $1,094,000. Construction of a mess hall at the Naval Submarine Base, New London, Conn. Eastern Div., Naval Facilities Engineering Command, New York, N.Y.

AIR FORCE

3—Stromberg-Carlson Corp., Rochester, N.Y. $1,074,452. Central telephone office equipment. Rochester. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

—Chicago Aerial Industries, Barrington, Ill. $3,619,016. Aircraft camera systems. Barrington. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

4—General Dynamics, San Diego, Calif. $1,882,539. F-106 aircraft. San Diego. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

5—RCA, Burlington, Mass. $1,000,000. Work on an airborne data automation system. Burlington. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass.

—Hughes Aircraft, Los Angeles, Calif. $1,750,000. Production of electronic equipment for F-105 aircraft. El Segundo, Calif. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

6—Dynamics Corporation of America, Garden City, N.Y. $1,000,000. Production of modification kits for radar bombing systems. Garden City. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

—Curtiss-Wright Corp., Wood-Ridge, N.J. $1,000,013. Engineering services to support R-3350, R-1820 and R-1300 reciprocating aircraft engines. Wood-Ridge. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

—General Dynamics/Convair, San Diego, Calif. $2,800,000. Procurement of Atlas/Agena space boosters. San Diego. Space Systems Div., (AFSC), Los Angeles, Calif.

—Magnovox Co., Fort Wayne, Ind. $1,972,392. Production of airborne communications equipment. Fort Wayne. Warner-Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

7—General Electric, West Lynn, Mass. $3,856,171. Production of J-85 engines. West Lynn. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

11—Douglas Aircraft, Santa Monica, Calif. $1,992,418. Production of components for the Genie air-to-air missile. Santa Monica. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

—Lockheed Aircraft, Jamaica, N.Y. $4,290,000. Inspection and repair as necessary on C-121 aircraft. Jamaica. Sacramento Air Materiel Area, (AFLC) McClellan AFB, Calif.

—American Electric, La Mirada, Calif. $1,357,581. Production of external fuel tanks for F-101 aircraft. La Mirada. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

—Thiokol Chemical Corp., Brigham City, Utah. $1,601,000. Work on a post boost rocket propulsion system. Brigham City. Air Force Flight Test Center, Edwards AFB, Calif.

12—Fairchild Hiller Corp., Farmingdale, N.Y. $1,522,120. Production of components for the emergency flight control system of F-105 aircraft. Farmingdale. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

—Magnavox Co., Fort Wayne, Ind. $1,250,000. Production of airborne communications equipment. Fort Wayne. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Emerson Electric, St. Louis, Mo. $1,350,000. Production of a ground test system for the testing of aircraft avionics systems. St. Louis. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

14—AVCO-Everett Research Laboratory, Everett, Mass. $1,750,000. Work on the radiation research program. Everett. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—B. F. Goodrich Co., Akron, Ohio. $2,570,865. Production of F-4 aircraft tires. Akron. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

17—North American Aviation, Los Angeles, Calif. $3,147,858. Pylon assemblies for F-100 aircraft. Los Angeles. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

—Olin Mathieson Chemical Corp., East Alton, Ill. $1,452,000. Engine starter cartridges for B-57 aircraft. Marion, Ill. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

18—General Electric, West Lynn, Mass. $1,925,000. Production of J-85 engines for A-37 aircraft. West Lynn. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—North American Aviation, Anaheim, Calif. $1,200,000. Production of guidance and control systems for Minuteman II missile systems. Anaheim. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—General Electric, Philadelphia, Pa. $2,000,000. Research and development of MARK 12 penetration aid systems. Philadelphia. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—Daisy Mfg. Co., Rogers, Ark. $2,647,500. Production of non-explosive components for munitions. Rogers. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Superior Steel Ball Co., New Britain, Conn. $3,330,000. Non-explosive components for munitions. New Britain. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Koehler & Sons, Hatboro, Pa. $1,692,000. Non-explosive components for munitions. Hatboro. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Sterling Commercial Steel Ball Corp., Sterling, Ill. $3,217,500. Production of non-explosive components for munitions. Sterling. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Honeywell, Inc., Hopkins, Minn. $1,386,0[illegible] Non-explosive components for munitions. New Brighton, Minn. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

19—United Technology Center, Sunnyvale, Calif. $5,419,000. Long lead hardware for solid rocket motors for Titan III. Sunnyvale. Space Systems Div., (AFSC), Los Angeles, Calif.

20—Ryan Aeronautical Co., San Diego, Calif. $1,409,000. Target drones and related equipment. San Diego. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

21—Fairchild Hiller Corp., Farmingdale, N.Y. $1,250,000. Engineer services and materials related to installation of a flight control system in F-104 D/F series aircraft. Farmingdale. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

—TRW, Inc., Redondo Beach, Calif. $2,011,000. Research and development for long lead time items for the VELA satellite program launch vehicle. Redondo Beach. Space Systems Div., (AFSC), Los Angeles, Calif.

—AVCO Corp., Stratford, Conn. $1,864,0[illegible] Work on the Mark 11A re-entry vehicle. Stratford. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—North American Aviation, Anaheim, Calif. $3,055,000. Maintenance, repair, overhaul and modification of Minuteman guidance and control systems. Anaheim. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

24—L. T. Industries, Dallas, Tex. $1,302,75[illegible]. Production of aircraft bomblet dispensers. Garland, Tex. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—LLUTS Construction Co., Pueblo, Colo. $1,149,078. Construction of Minuteman training facilities. Minot AFB, N.D. and Warren AFB, Wyo. Corps of Engineers Ballistic Missile Construction Office, Norton AFB, Calif.

—COMCOR, Inc., Anaheim, Calif. $1,156,0[illegible] Procurement of an integrated computer system. Anaheim. Systems Engineering Group, Wright-Patterson AFB, Ohio.

25—General Electric, Cincinnati, Ohio. $5,69[illegible],400. Production of J-79-15 and J-79-11 aircraft engines. Evendale, Ohio. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

26—Westinghouse Electric, Baltimore, Md. $1,300,000. Engineering services and production of electronic countermeasure equipment. Baltimore. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Batesville Mfg. Co., Camden, Ark. $7,22[illegible],150. Production of dispensers for bomblets. Camden. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Lockheed Missile & Space Co., Sunnyvale, Calif. $1,061,000. Agena launch services at the Eastern Test Range. Cocoa Beach, Fla. Space Systems Div., (AFSC), Los Angeles, Calif.

—Radiation, Inc., Melbourne, Fla. $3,010,[illegible] Production of ground station telemetry equipment. Melbourne. Space Systems Div., (AFSC), Los Angeles, Calif.

—E. W. Bliss Co., South Portland, Maine. $1,259,660. Production of aircraft arresting barriers. South Portland. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

27—North American Aviation, Canoga Park, Calif. $1,138,835. Engineering support of the Atlas booster engine systems. Canoga Park. Space Systems Div., (AFSC), Los Angeles, Calif.

—Ajax Hardware Corp., Industry, Calif. $1,221,253. Production of bomb components. Industry. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

28—Philco-Ford Corp., Palo Alto, Calif. $1,340,000. Work on a satellite control network. Palo Alto. Space Systems Div., (AFSC), Los Angeles, Calif.

—Philco-Ford Corp., Palo Alto, Calif. $1,519,067. Design, development, fabrication, flight test and data analysis of re-entry measurement vehicles. Newport Beach, Calif. Ballistic Systems Div., (AFSC) Norton AFB, Calif.

—Martin-Marietta, Denver, Colo. $3,100,0[illegible] Work on the Titan IIIM space booster. Denver. Space Systems Div., (AFSC). Los Angeles, Calif.

—International Telephone & Telegraph, Nutley, N.J. $2,660,206. Airborne LORAN navigational sets and related equipment. Nutley. Aeronautical Systems Div, (AFSC) Wright-Patterson AFB, Ohio.

DCAS Seeks Better Administration of Government Property in Plants

A new policy for better administration of Government-owned machinery, industrial buildings and basic materials for producing defense products has been initiated by the Defense Contract Administration Services (DCAS) of the Defense Supply Agency.

Major General John A. Goshorn, USA, Deputy Director for Contract Administration Services, who has the operational responsibility for administration of industrial property, has directed that a large percentage of his nation-wide work force of 22,000 employees apply specialized technical talents to administering Government-owned industrial property in contractors' plants.

Previously, approximately 300 property administration specialists in the 11 DCAS regions in the United States have carried the entire burden of overseeing the hundreds of millions of dollars worth of Government property in plants. The new policy leaves the basic responsibility with these specialists but assigns, in addition, responsibilities to various other contract administration specialists who are at or near contractors' plants to watch over specialized aspects of property administration.

The new emphasis on property administration is in line with a directive from President Johnson to heads of Government departments and agencies for "improvement in property management by contractors." DCAS personnel do not directly manage Government property in plants; rather, they represent the Government in plants to assure that contractors comply with standard provisions of the Armed Services Procurement Regulation and their own contractual agreements relating to Government property. Quality assurance representatives, industrial specialists, transportation officers and specialists will continue to have overall responsibility.

Following are some of the principal characteristics of property administration with indications of the qualified specialist to be assigned:

Maintenance. A direct relationship exists between product quality and the care of the equipment or tooling used to produce the item. For this reason, DCAS quality assurance representatives will monitor the contractors' maintenance of Government-owned plant equipment, special test equipment and special tooling. Maintenance of Government-owned real estate or structures will be surveyed by DCAS industrial specialists.

Utilization. Government property provided to contractors may be used only for purposes authorized and must be returned when that use is no longer justified. Because of the relationship of the use of industrial plant equipment to the contractors overall production capacity or need, industrial specialists will be responsible now for surveying contractors' utilization controls over that kind of property.

Excess Declarations. In the economic reutilization of Government property the true condition of items must be described to the contractors and military installations who are potential users; otherwise, unnecessary and costly shipments of unusable material or equipment may result. Since the condition of property is ordinarily based upon a final inspection, verification of contractors' descriptions has been assigned to quality assurance representatives.

Shipment. There are many reports and methods for adjusting overages, shortages, or damages that are found to exist upon receipt of shipments of Government property. Since these matters relate to packaging, preservation and transportation regulations, the responsibilities are being defined and assigned respectively to quality assurance representatives and transportation agents.

Coordination. In order that there will be no wasted or duplicative effort, more effective use will be made of existing documentation of Government industrial property. Examples are in the use of quality assurance representatives' controls over property returned to a contractor for analysis in connection with a material deficiency complaint. Also, when specialized safety engineers in the course of their plant safety surveys detect potential hazards that could jeopardize property, their recommendations will be made available to property administrators. Likewise, when quality assurance surveys encounter excessive rejects or undue waste in production or fabrication, quality assurance representatives will provide appropriate comments to property administrators.

These management improvements will soon be formalized and published as changes in applicable DCAS operating manuals. However, many of them are now in operation with encouraging results. The whole system will be in operation before the end of 1967.

DEFENSE PRIME CONTRACT AWARDS TO SMALL BUSINESS

(Amounts in Thousands)

	July 66–Feb. 67	July 65–Feb. 66
Procurement from All Firms	$25,451,246	$20,042,934
Procurement from Small Business Firms	5,112,317	4,275,718
Percent Small Business	20.1	21.3

OFFICE OF THE SECRETARY OF DEFENSE
WASHINGTON, D. C. 20301

OFFICIAL BUSINESS

POSTAGE AND FEES PAID

United States, Australia, Canada To Develop Tactical Communications System

The United States will participate in a major cooperative program with Australia and Canada to develop a comprehensive tactical communications system common to the field armies of the three countries.

The system, known as the Mallard Project, will employ all modes of message and data transmission, ranging from simple written messages and voice-radio links to automatically switched, digital systems and, possibly, communications satellites.

Brigadier General Paul A. Feyereisen, USA, has been designated the U.S. program manager for the Mallard Project. Lieutenant Colonel L. G. Moore and Lieutenant Colonel D. C. Coughtry have been named program managers for Australia and Canada, respectively. The office of Mallard's U.S. program manager and the project's primary operating element, the International Joint Engineering Agency, will be located at Fort Monmouth, N.J.

In the initial development phase of the program, competitive system design studies will be solicited from U.S. industry. Participation by industry of all three countries will be encouraged in the conduct of certain supporting technique efforts. The schedule calls for a five- to seven-year research and development program, and a follow-on phase for equipment production, to provide the Mallard system for the participating armies in the 1975–77 time frame.

The system approach will incorporate the building-block or modular principle of equipment construction to ensure flexible inter-operation between the field armies of the three countries and, with the proper combinations of subsystems, to provide comprehensive communications ranging from front-line fighting units through major echelon headquarters to inter-operation with world-wide strategic systems.

State-of-the-art technology will be employed to reduce the size, weight and reaction time of system components and to incorporate the concepts of mobility, versatility and high reliability.

New Navy R&D Facility Features Huge Spin Chamber

The Government's largest spin chamber has been put into operation by the Naval Air Engineering Center, Philadelphia, Pa., as part of its Aeronautical Engine Laboratory's Containment Evaluation Facility (AELCEF). Goal of the facility will be to provide lightweight containment/control devices that will prevent fragments of failed turbomachines from injuring personnel and minimize aircraft damage.

A feature of the AELCEF is the capability to photograph the interactions of fragments and the containment of deflection devices. Action is recorded by a high speed continuous framing camera that can be positioned at either one of four photographic observation ports located around the chamber.

The AELCEF is equipped with airpowered drive turbines that can rotate a variety of fragment generators over a wide range. A 1,000-pound work piece can be rotated at 25,000 rpm and an eight-pound piece can be spun to a maximum of 150,000 rpm.

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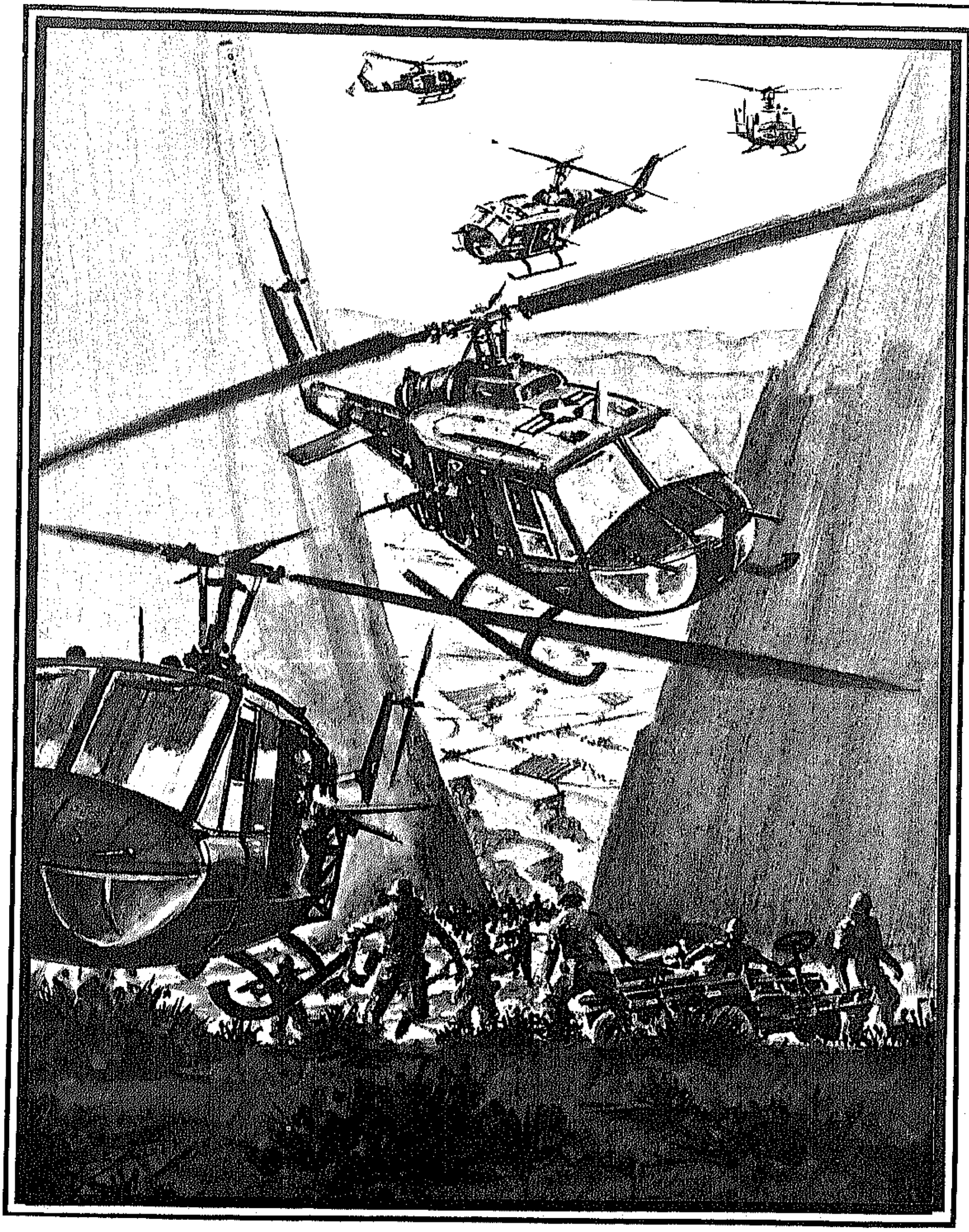

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NOTICE

The cover date for this issue of the *Defense Industry Bulletin* has been altered June/July so that hereafter it can correspond with the month in which the *Bulletin* is received by subscribers. There will be no interruption in continuity of publication; the next issue will be identified as the August issue and should be in your hands early in August.

The *Defense Industry Bulletin* is published monthly by the Business & Labor Division, Directorate for Community Relations, Office of the Assistant Secretary of Defense (Public Affairs). Use of funds for printing this publication was approved by the Director of the Bureau of the Budget.

The purpose of the *Bulletin* is to serve as a means of communication between the Department of Defense (DOD) and its authorized agencies and defense contractors and other business interests. It will serve as a guide to industry concerning official policies, programs and projects, and will seek to stimulate thought by members of the defense-industry team in solving the problems that may arise in fulfilling the requirements of the DOD.

Material in the *Bulletin* is selected to supply pertinent unclassified data of interest to the business community. Suggestions from industry representatives for topics to be covered in future issues should be forwarded to the Business & Labor Division.

The *Bulletin* is distributed without charge each month to representatives of industry and to agencies of the Department of Defense, Army, Navy and Air Force. Requests for copies should be addressed to the Business & Labor Division, OASD(PA), Room 2E813, The Pentagon, Washington, D.C. 20301, telephone, (202) OXford 5-2709.

DEFENSE INDUSTR

BULLETIN

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A Challenge to Industry

Military Economic Impact Today

Major General Allen T. Stanwix-Hay, USA

[Editor's Note: Major General Stanwix-Hay, Deputy Assistant Secretary of Defense (Materiel), is "Mr. Intensive Management" within the Office of the Assistant Secretary of Defense (Installations and Logistics). His organization directs a production, consumption, and inventory control and reporting system that has increased management visibility on the actual and forecast availability of a controlled list of air and ground munitions, aircraft, missiles, and other major items from the lowest Service user unit in Southeast Asia to the desk of the Secretary of Defense. The objective is to provide a viable production base and logistic system responsive to the changing needs of field commanders but, at the same time, to prevent the creation of large surpluses of excess materiel similar to those existing after World War II and Korea. In this article he offers his thoughts on some of the comparative policies, practices and responsibilities between industry and DOD in this highly complex area of materiel management.]

HAVING read many articles in the *Bulletin* by members of the Services on such subjects as guns, ships, planes and butter, I feel that these subjects have been adequately covered and I will not discuss them. Rather, I shall discuss the impact in selected fields of these guns, planes, ships, and butter on the American economy from a DOD viewpoint.

What about competition? Paul Hoffman once pictured American businessmen as tossing from side to side and haunted by nightmares of competition. While I appreciate Mr. Hoffman's views, from my experiences I think the typical businessman has long ago decided that competition is an evil to be got rid of as thoroughly as possible. Pierpont Morgan said,

> **"By instinct, if not by reason, most businessmen hate competition. A man's competitor is the fellow who holds down his prices, cuts away his profits, tries to seize his markets, threatens him with bankruptcy, and jeopardizes the future of his family."**

In DOD we attempt to maintain our effort in competitive procurement to a high degree. Defense contracting officers are allowed sole source procurement only when necessary, and utilization of negotiation only when necessary. Generally speaking, the policy is still toward competitive procurement. In a time like this we do guard against breaks in production more assiduously than under a full peacetime environment. If I seem to be weasel-wording these statements, please recognize that I am doing just that. In our attempts to hold to competitive policies, we are being realistic in our knowledge that intensive management demands no break in going production quantities.

In recent years investment in new capital facilities has increased and, along with the base for more industrial construction and equipment, prices, wages and order backlogs in this field have been mounting. There have been efforts in Government designed to retard expenditures for new and improved production facilities. More recently there has been another change and a return to the Government's tax incentive for capital expansion. I know that a number of economists applauded those beginning actions against capital improvement as timely anti-inflationary moves.

I can't very well disagree with them as economists. However, having responsibilities in the field of production and thinking in terms of plant obsolescence and high-cost managerial facilities, I believe that no company, no industry, and no nation can afford to fall behind in this highly competitive, technological race that is being run throughout the world today. When I think of this, I think of our shipyards. When comparing our shipbuilding methods with Sweden and Japan today, I become ill at ease. To my way of thinking, the increased expansion and modernization of production capacity, which automatically occurs in free market economy in times of rising demand and increasing prices and profits, is one of the most effective business weapons we have.

Since 1946, one of our major national objectives has been to achieve maximum employment with price stability. We have pursued in our national policies a stimulation of demand, an increase in productive capacity, and these have contributed to the labor force usage factors that now exist.

Today we must confront the problem of reconciling maximum employment with price stability. Economic theorists face these as never having been done in recent history. Yet if we cannot solve this, we must either accept mounting costs as the price of high employment or resign ourselves to a reservoir of idle manpower as the cost of price stability. If our system of a people's economy is valid, and if our political courage is sound, we should solve this by and in the market place with government backing.

I am told that the readers of this magazine pride themselves on being a group of hard businessmen! And I think that's good, for then we can lay our points on the table in a hard business way.

Three Questions.

This section I'm going to title "What Would You Have Me To Do Department." In it I'm going to ask three questions without discussion, and without answering the questions. The sole purpose of this section will be to ask you to think.

Question One: An item made by specialist producers generally in or on

the fringes of a scarce industry is offered for bid to 48 producers and among them are 12 mobilization producers. In answer to this proposal six replies are received, none of which is from planned producers. Then, four additional foreign proposals are received, all technically better than any received before, and all four at considerably lower prices than any of the domestic offers. As a taxpayer, what would you have me do?

Question Two: From a Qualified Bidders List of 24 in number on a procurement for a considerable quantity of a fairly scarce item, only one producer is said to be capable of fully answering the specification, and that one is a foreign supplier. You are asked to approve a sole source buy from that one foreign producer. What would you have me do?

Question Three: In my talks with businessmen around the country, I continually hear it said that "Defense is another customer, and a hard one with which to do business." Would you have me otherwise? After all, it's your money I'm spending.

One of many points in this business that intrigues me is the charge to get the best that can be obtained for the lowest cost. This is a good, sound business axiom. Many American industries have taken American dollars and made connections, opened factories, obtained import licenses, etc., with out-of-America producers in all countries of the world. The savings from outside connections are not necessarily passed on to DOD although it is said American industry becomes "competitive" by these foreign connections.

Since it is profitable for industry to buy and import for sale to DOD, since it is profitable for industry to enjoy the reduced labor costs of lower economic countries, since admittedly DOD is one of many customers, why should DOD not buy in quantity direct from the same foreign producers as industry? Why should DOD not expand its production base in the same manner as industry has?

One of the aspects of capital investment during a time of large DOD expenditures is who should finance the expenditure, industry or Government? I would hope that the increase to overall capacity would come from industry. Rare indeed is the military manufacturing technique or material which does not ultimately find its way to commercial use. I can understand industry's reluctance, without meaningful incentives, to make substantial capital investments in special purpose equipment or in temporary, one-shot wartime surge requirements. But as the Assistant Secretary of the Air Force Robert H. Charles so aptly states:

"I cannot understand the reluctance of industry, if the requirement appears to have reasonable stability in a non-wartime environment, particularly where the new equipment can do a better job faster and at lower cost. The airlines do not provide machinery and equipment to the manufacturers of commercial aircraft. Was there more certainty to the 747 than to the C–5 at the beginning of those programs?"

Mr. Charles continues to point out that, because of this reasoning, the C–5 competition specified, for the first time on a major program, that the winners would furnish all additional equipment. Lockheed and General Electric are so doing.

The U.S. Government is becoming a great owner of tools and manufacturing equipment. The correct balance of how much and what is too much government ownership of productive capacity is a very delicate question. The views of John Kenneth Galbraith are very pertinent to this subject. Mr. Galbraith says:

"The line that now divides public from so-called private organization in military procurement is so indistinct as to be nearly imperceptible. The mature corporation will eventually become a part of the larger administrative complex with the state. In time, the line between the two will disappear."

I do not like the prospect.

Maj. Gen. Allen T. Stanwix-Hay, USA, is Deputy Assistant Secretary of Defense (Materiel) in the Office of the Assistant Secretary of Defense (Installations & Logistics). Before this appointment he was Special Assistant to the Assistant Secretary with responsibilities for coordination of all Southeast Asia logistic support matters. He also served as Test Director for "Project 60" which led to the establishment of the Defense Contract Administration Services Regions in the continental United States.

Mobilization and Demobilization

One of the most interesting and imaginative innovations in the present management of the Defense Department is a firm belief in intense management. Intense management is a way of life that says our nation can afford any necessity for defense; that all things necessary for defense will be provided; that the military commanders' stated requirements will be furnished; and, finally, that management by competent persons will be applied so as to provide the requirement at lowest overall cost ending up without an overbearing surplus.

It so happens that I fully subscribe to the belief in intense management, both as a military man and as a civilian. To be honest, let's frankly state that many do not fully subscribe to the belief.

One might ask what this has to do with mobilization and demobilization and I would answer, "Everything!"

Under a program of intense management one should know certain facts. One should know *production requirements, capability* and *schedules*. One must *know, estimate,* or *assume* consumption. One must know *inventory* and *location of inventory*. One must know *transportation*. These are basics, and all other thoughts that come to mind such as cost, storage, condition, etc., are either all a part of a basic or fringe benefit to the basic.

Under intense management, the manager *must be able* to know when too much is coming from production and be willing to order a curtailment. Conversely, the manager *must be able*

to know when the input from production is too little, and must be both *able* and *willing* to order a timely increase to production.

The foregoing is not fancy; it's management. It's the way any profitable business is run, and I believe defense is business. In establishing the production base for certain items, one designs, engineers, calculates, estimates—call it what you will—the requirement, the consumption, the desired inventory, transit time. Then one builds the adequate base to produce. From such a base one moves up or down as the requirement varies in increments of change. Perhaps industry does not like the ups and downs of intense management, but doesn't it operate that way? Doesn't industry lay off when demand is low, hire back in full production? Why is it wrong for DOD to do so?

I HAVE chosen to write of intense management in this section on mobilization and demobilization because these areas have been the stepchildren of planners. "Mobilization" for a time was simply to turn on all production and flood equipment in all directions. For a period of time some agencies of the DOD refused to believe in mobilization planning because of the nuclear concept of war. Now it seems prudent to plan for mobilization under varying conditions—mobilization with imagination, if you will. But as in intensified management for mobilization, cannot we plan for demobilization as well?

Consider a theorist's view for a moment. Under intensive management during conflict, when production, consumption, planned inventories are held in balance, isn't it fully possible to plan for production manipulations when peace comes again? One knows, for example, the peacetime reserve desired. Therefore, at the end of conflict (end of major consumption) one allows production to flow through the proper leadtime, then one reduces production to meet peacetime requirement. It is a *planned* demobilization, not a sharp cut-off of production! Theoretical? No more so than a General Motors model changeover each year. Yes, it takes skill, imagination and the ability to enforce decisions, but those are the characteristics for which men are paid as managers.

Civilian and Defense Economics

My inclination has been not to mention the conflicts of a full civilian economy and a partial defense economy going side by side. Everyone with whom I have sought refuge in preparing this article, however, has cautioned me that this, as well as intensive management, would demand recognition.

It would be foolhardy to state that conflicts do not arise as these two behemoths of economics charge down the same road, involving the same industries and affecting the same people. The obvious conflicts arise in extended leadtimes for production, greater demand than capacity for machine tools, extrusions, forgings, and work forces. With defense priority systems in effect, the *defense* slow-up is minimized, but certainly pressures are placed on the civilian economy in these areas.

The small business man, particularly the small, non-defense manufacturer, feels more keenly the press and priority of defense business. Hardly a day passes that I am not asked by a small producer to rule on the justification of a priority for a needed item, a needed forging, a needed tool, casting, machine, etc. These requests come from the smallest businesses, from fishing supplies producers to home builders, air-conditioning parts producers and installers. Unfortunately, there is little that I can do to aid the applicant through the Defense Department, except refer him to the Department of Commerce.

Because of the fundamental laws of supply and demand, the cost of labor tends to increase. U.S. industry in 1967 shall probably feel the pressure of organized strikes by labor. Most of the larger union contracts in mass industries have been or will be up for review, as are the basic industry contracts in metals and chemicals. The operating ratios of industry have been high, and labor generally bargains hardest in times of plenty. I do not expect this year to be an exception.

The rights of labor at the bargaining table have long been recognized in our country as one of our cherished privileges. Our Government will go through great difficulties to assure that the rights to unfettered bargaining by labor and management are maintained. It is only with real and sincere reluctance that our Government will enter into negotiations. Federal mediators will go to great lengths to keep the parties in negotiations within local surroundings. Should the need be great and progress little, the mediator with great patience might suggest a change of location for mediation and, as a last resort, may have to recommend to the Justice Department that legal injunction appears to be the sole hope of getting the parties back to work. There have been few applications of legal injunction but, when necessary for the best interests of the Government and the people, it has been invoked.

It is not always the big name industry that causes the most serious problem in defense production. A small producer of a unique chemical, a wholly owned process, or a particular skill can cause more concern than a large producer of competitively produced products. In this day of space-age production, high reliability parts, critical temperature applications, chemicals, bearings, it is usually the highly skilled, small producer who gains the top spot attention in my office.

Balance of Payments

Now what about our balance of payments? Actually, we did pretty well last year. Treasury Secretary Fowler reported that the payments gap deepened in the final quarter but, thanks to an earlier inflow of outside capital, the deficit was held to a very marginal increase over 1965.

Considering the problems created by Vietnam, this has to be judged as a respectable showing. The total was roughly half the deficit in 1963 and 1964. The direct foreign exchange costs of Vietnam increased last year by roughly two-thirds of a billion dollars. The tight money situation at home saved matters from being much worse; high interest rates attracted enough foreign capital to offset the war's effect and this, combined with a lowered level of American investment and lending abroad, kept the payments gap within manageable bounds.

Shortage of Skilled Labor

Let me touch for a moment on scarce trades in industry today. To put it bluntly, it seems that trades requiring hard physical labor, long periods of apprenticeship, and some natural skills are more suspect for labor

(*Continued on page 16*)

$1.75 Billion in FY 1966

The Armed Forces Grocery Bill

Lieutenant Colonel Richard M. Hosler, USAF

The responsibility for subsistence procurement for the Armed Forces is assigned to the Defense Supply Agency's Defense Personnel Support Center (DPSC) in Philadelphia, Pa. DPSC is the national inventory point for procurement, storage and issue, at the wholesale level, of practically all subsistence for the Military Services.

The total DPSC business volume distributed throughout the U. S. food industry exceeded $1.75 billion in FY 1966. Purchases by DPSC's Subsistence Regional Headquarters amounted to $1.22 billion. Military installations obligated $142 million in the form of delivery orders against indefinite delivery type contracts consummated by DPSC for commodities such as milk, milk products and bakery products. Delivery orders against brand name contracts amounted to $456 million.

As one might suspect from examination of his own household grocery bills, beef is the biggest dollar item in DPSC's grocery basket. About $227 million was spent in FY 1966 for carcass and fabricated beef; $36 million for bacon; $38 million for ham; $26 million for chicken; $31 million for coffee—just to provide some insight into individual item purchase volume. Perishable commodities represent about 53 percent of dollar expenditures with the balance for nonperishables, such as sugar, flour, and other canned and dehydrated items. In total, over four billion pounds of subsistence were purchased with the $1.22 billion.

While the headquarters of DPSC is located in Philadelphia, the actual purchasing of subsistence is accomplished by nine DPSC Subsistence Regional Headquarters (SRH) located in principal cities throughout the United States. A tenth SRH, located at Columbus, S.C., was closed on April 30, and the SRH in Fort Worth, Tex., is scheduled to be closed in July 1967.

Addresses of the nine SRH's are:

Chicago Subsistence Regional Headquarters
536 S. Clark St.
Chicago, Ill. 60605

Fort Worth Subsistence Regional Headquarters
Felix at Hemphill St.
Fort Worth, Tex. 76115
(Scheduled to be closed in July 1967.)

Kansas City Subsistence Regional Headquarters
623 Hardesty Ave.
Kansas City, Mo. 64124

Los Angeles Subsistence Regional Headquarters
929 S. Broadway
Los Angeles, Calif. 90015

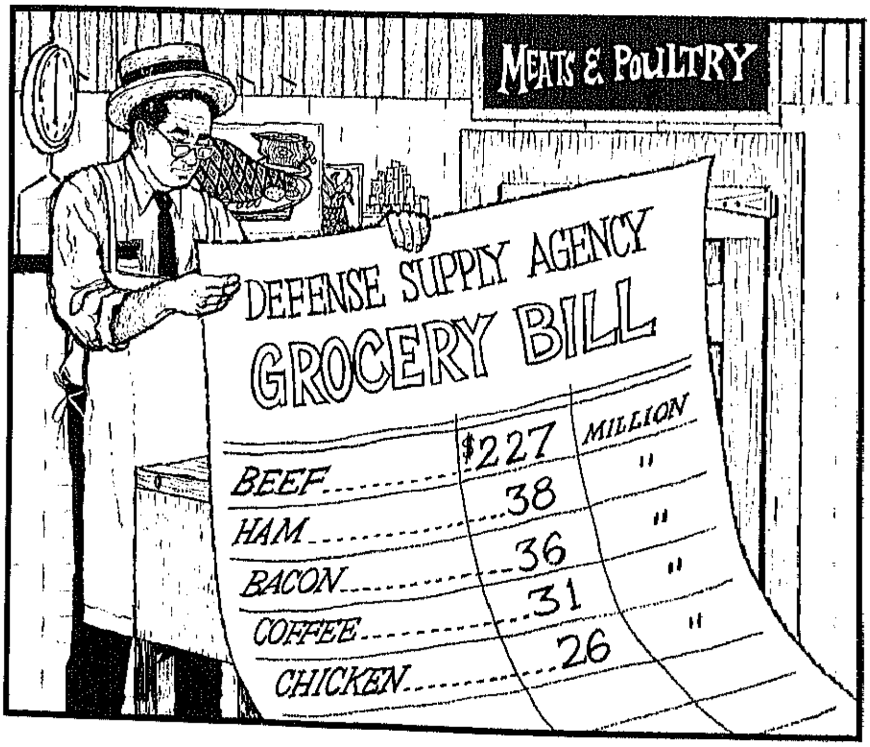
New Orleans Subsistence Regional Headquarters
4400 Dauphine St.
New Orleans, La. 70140

New York Subsistence Regional Headquarters
Third Ave. and 29th St.
Brooklyn, N. Y. 11232

Oakland Subsistence Regional Headquarters
2155 Webster St.
Alameda, Calif. 94505

Richmond Subsistence Regional Headquarters
c/o Defense General Supply Center
Richmond, Va. 23219

Seattle Subsistence Regional Headquarters
Pier 91
Seattle, Wash. 98119



The regional headquarters are assisted by additional field supply and purchasing offices that are strategically located in areas of production and need. DPSC headquarters in Philadelphia performs no subsistence contracting, *per se*, except for indefinite delivery type contracts for brand name items sold in commissaries. In such cases, delivery orders against these contracts are placed by continental United States commissaries directly to the company involved. Overseas commissary requirements from DPSC brand name contracts are submitted directly to the assigned servicing port SRH which, in turn, places a delivery order to the supplier-contractor. Arrangements are made by the servicing SRH to ship the required items to the customer commissary.

While DPSC, through its SRH's, is a decentralized operation organization-wise, subsistence procurement procedure embraces centralization of purchasing for all items to the maximum extent possible in order to realize the economies derived from carlot purchases and shipments. This is accomplished by assignment of commodities to control SRH's. Procurement of all subsistence is by specification, and purchases are made on a fully competitive basis from qualified industrial sources throughout the United States.

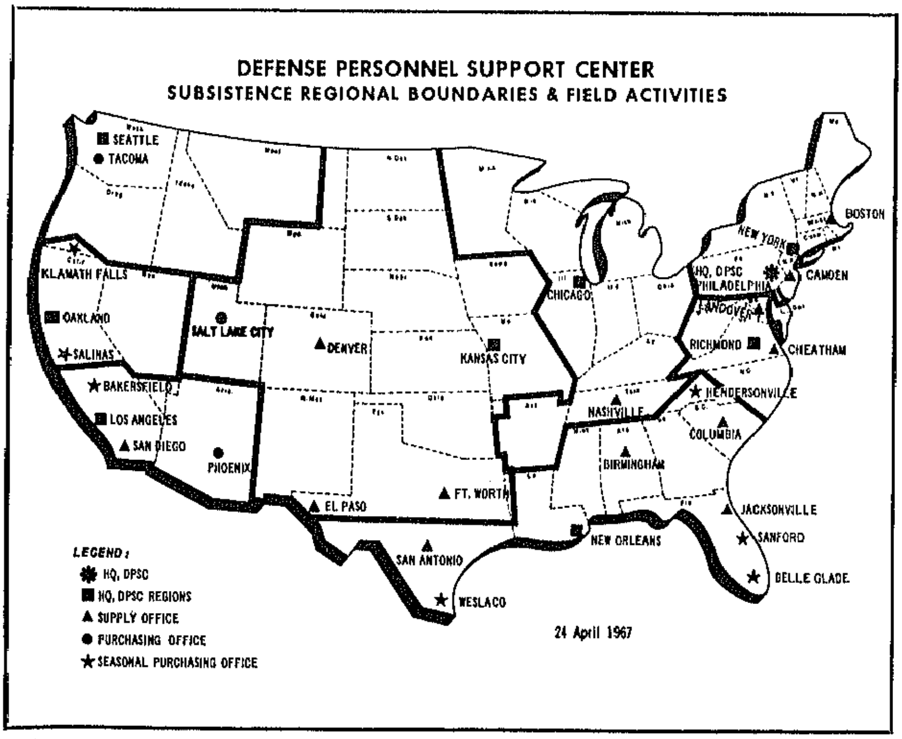
In the area of non-perishables, for example, all roasted and ground coffee is purchased by the SRH New York, canned meats and shortening by SRH Chicago, canned fruits by SRH Oakland, and canned salmon by SRH Seattle. Each depot-stocked, non-perishable item is assigned to one of the SRH's for purchasing, once a funded procurement directive or requisition is generated. Each non-perishable control SRH is responsible for its own solicitation and contract administration, based on standardized policies and procedures issued by DPSC headquarters in Philadelphia. Procurement cycle and timing for non-perishables is based on several variable factors common to each particular item and seasonal considerations. If the item is available at fairly stable prices throughout the year, it may be purchased on a monthly or quarterly basis. Such seasonally packed items as canned fruits and vegetables, on the other hand, are most frequently purchased on an annual basis. In any event, both procurement cycle and timing of actual purchases are under the close control of DPSC headquarters, and the SRH's react according to its direction.

Perishables, fresh and frozen, are handled somewhat differently from non-perishables. Such commodities must normally be purchased as close as possible to consumption date because of their perishability, which makes them subject to varying rates of deterioration and wide price fluctuations in the market place; the latter is due to very sensitive supply and demand factors that are always at work in the food business.

Purchasing of perishables is a fast-moving, fascinating operation and varies somewhat with each group of commodities. All are purchased under the widest possible competition but items, such as fruits and vegetables will be sight-selected by DPSC buyers in the field or local market, while other items, like meat and cheese, are procured by nation-wide competitive bidding. Offers against most perishable solicitations are seldom provided more than an hour or so before closing and, within a period of several hours after closing, the offeror expects to know if he won an award. This is the normal commercial practice for dealings in most perishables on which the prices are quite volatile on the open market, and this follows the original concept for coordination of mass buying of subsistence as established at the inception of centralized food buying at the former U.S. Army Quartermaster Market Center in 1941.

Continental U.S. military installations submit requisitions for perishable commodities to the SRH's in whose geographical area they are located. Overseas commands requisition to the port SRH's that are assigned the servicing of their demands. Each SRH consolidates all requirements into the maximum of carlots and then transmits these requirements, except for fresh fruits and vegetables, to the control SRH that is responsible for national carlot solicitation. The control SRH solicits on a national vendors mailing list. Offers against solicitations are given by vendors to the SRH in whose area they are located. Closing time is simultaneous throughout the nation. The low offers received by each SRH are teletyped to the control SRH, where the low offeror in the nation is determined. Within an hour or two, the SRH from whom the lowest offer was received is advised to make award and that SRH administers the contract to completion.

SRH Chicago is the control region for the most carlot perishables. Exceptions are: shrimp—SRH New Orlean; eastern oysters—SRH Rich-



mond; Atlantic varieties of fish—SRH New York; Pacific varieties of fish, including oysters—SRH Seattle. Because of the restricted geographic areas of availability for seafoods, the control SRH generally receives offers to its solicitations directly from all vendors.

The procedure varies somewhat for fresh fruits and vegetables. There is no control SRH for procurement of these extremely perishable commodities because the geographical availability varies for each item throughout the year. DPSC's purchasing agents must go where the crops are at the moment. The consolidated carlot requisitions for fruits and vegetables are, therefore, referred by the requiring SRH directly to the SRH in the appropriate growing area for accomplishment of purchase and timely delivery. A guide to growing area availability is provided by DPSC on a monthly basis to all SRH's for use in referral of requisitions. Weekly supplemental market information is also provided when appropriate. Less-than-carlot quantities are bought from the local wholesale fruit and vegetable market on a competitive basis and by sight selection. Both field and local market (street) buyers are qualified contracting officers' representatives, being assigned as such on orders.

Only minimum operating levels are maintained by SRH's for frozen and some fairly stable refrigerated items to assure responsive supply. Other items, such as chilled meats, fruits and vegetables, must be promptly purchased for shipment. Items that cannot be carlotted, as described previously, are purchased by each SRH on a wide competitive basis against their own approved vendors' mailing lists. Any SRH encountering difficulty in procurement of less-than-carlot items may call on DPSC headquarters in Philadelphia or any other SRH for assistance. If an item is available anywhere in the nation, DPSC can find it and buy it.

Several methods of procurement are utilized in DPSC's subsistence purchasing program. Most contracts are firm-fixed price and negotiated under the provisions of the Armed Services Procurement Regulations (ASPR) that permit DPSC's informal competitive Notice of Intent to Purchase (NIP) as well as field and street buying to be used for subsistence. The NIP procedure provides wide competitive procurement, yet permits a degree of flexibility that is deemed necessary for the volatile and fluctuating food market. This procedure permits negotiation with all offerors at any time prior to award.

The ASPR and the Public Law, as announced by the Congress, require that formal advertising be used whenever such method is feasible and practicable under existing conditions and circumstances. Formal advertising is competitive bidding, the same as obtained under DPSC's NIP procedure, except that bids are sealed and must be in writing; bids must comply in all material respects with the Invitations for Bid; and there is a formal and public bid opening to ascertain and establish the successful bidder. Due to daily fluctuations in price and availability of most perishable commodities, formal advertising is neither feasible nor practicable. However, formal advertising has been used extensively for non-food items, such as ration assembly contracts for the assembly and packaging of operational rations. It is also utilized for certain non-perishable food items where it is feasible and practicable.

The NIP procedure has many advantages. It may be used on a one-time basis for a definite quantity, or as a basic NIP without specific quantities but covering an extended period of time, usually three months. As firm requirements arise, solicitations are made against the basic NIP by use of an addendum which is specific regarding quantities, closing dates, delivery schedules and other appropriate information. This procedure substantially reduces the amount of paperwork in DPSC's frequent purchases since purchases of perishable commodities are made virtually every working day of the year.

About the Author—

Lt. Col. Richard M. Hosler, USAF, is the Chief of the Subsistence Division, Directorate of Procurement and Production, of the Defense Personnel Support Center, Philadelphia, Pa. His previous assignments include Commander, Subsistence Regional Headquarters at Kansas City, Mo.; services with the U.S. Air Force Inspector General's Office in the procurement and production inspection activities; and extensive procurement experience with the Air Force.

In field buying of fruits and vegetables, the carlot or trucklot requirements to be purchased are disseminated to the trade. The expert field buyer makes the visual comparison of offers and best-value selection of these very sensitive perishable items in the fields or sheds of vendors who offer products. All facets of this buying operation must move expeditiously in order to minimize quality reduction from purchase to consumption. The purchased product is shipped to DPSC supply points for breakout and issue to requisitioners, or an entire shipment may be sent direct to large military installation.

The street buying of less than carlots of fruits and vegetables on the local market most frequently involves utilization of a blanket purchase agreement (BPA), which amounts to an agreement with each contractor to supply specified items on call and the contractors must agree that the price he charges will be no higher than the price he charges his most favored customer. Several companies in each market are on BPA's and competition must be obtained for each call that is made by the expert street buyer, who is assigned to make his visual selection from the local market. Under this procedure contractors bill DPSC weekly, semi-monthly, or monthly, similar to a charge account.

DPSC was created and is being maintained to provide a single organization within the Defense establishment where military consumers can look for supplies and industry can look for sales. Active participation by the food industry is regularly solicited and size is no deterrent, as evidenced by the $683 million awarded to small business during FY 1966. The organization is flexible and prepared to adapt to changes in demand placed upon it by its customers. A good example is the introduction of a sizable list of the rather sophisticated freeze-dehydrated foods such as shrimp, cottage cheese, chicken and beefsteaks. Production testing of irradiated bacon for possible later procurement has been completed, and a production test of irradiated potatoes is in process. As demands of the Military Services for products from these new processes evolve, DPSC's representatives will be working with industry in the development of a wide procurement base.

The Challenge of Army Requirements to Aerospace Technology in the 1970's

Brigadier General John R. Guthrie, USA

RECENTLY the Army reviewed its requirements for the 1970's in the aerospace technological area. In reviewing the future Army research and development requirements, the first thing which comes forcibly to the fore is anti-ballistic missile technology—as exemplified by the Nike program. Nike X is the Army's most expensive single research, development, test and evaluation (RDT&E) program. Of the $1.5 billion in this year's RDT&E budget, approximately 30 percent is going to Nike X.

This extremely complex program can probably be said to have started in 1957. At that time the requirements laid on the research program were relatively uncomplicated. They were to compete against an attack of relatively few missiles with unsophisticated decoys and penetration aids. This was the original Nike Zeus system, a system with its basic radars and one type of missile capable of handling only a few targets at a time. Today, the threat may consist, literally, of a cloud of warheads and decoys. As a result, the program was reoriented in 1963 to the present Nike X concept.

The major parts of the new Nike X system are a multi-function array radar called the MAR; a missile site radar—the MSR; a third newly established radar with a longer wave length for handling long distance targets—the peripheral acquisition radar (PAR); an improved Zeus missile for long-range intercepts; the Sprint missile for short-range intercepts; and very high-speed digital multi-processor computers.

The major radar in the system is the MAR, of which the one at the White Sands Missile Range is our test-bed model. The MAR is designed to perform the function of four conventional radars by target detection and identification, target discrimination and sorting, target tracking, and interceptor missile tracking and guidance. Since it is a phased array radar and uses electronic beam steering, it can perform all of these functions nearly simultaneously. The outgoing signals leave via the smaller face, with the return signal received through elements in the larger face. Another of its major assets is the ability to harden the site, i.e., protect it from all but a direct hit by burying most of the components, including data processors, deep underground. We currently foresee the MAR to be about as high—or as deep—as a 10-story building.

The Nike X system will employ two solid propellant nuclear warhead missiles—the long-range Spartan and the short-range, very high acceleration Sprint. The Spartan is an improved edition of the earlier Zeus which has already proven itself capable of intercepting both ICBM target vehicles and satellites. While the Spartan is designed for long-range, high-altitude and high-kill radius intercepts, the Sprint is a relatively short-range missile. The unique characteristic of this bullet is its acceleration—it can climb upward a mile in the time of two heart beats. The Spartan would destroy or damage nearly everything in a cloud, while the Sprint would be fast enough to allow us to take advantage of atmospheric filtering as a discriminating agent and of previous action by the Spartan.

The Sprint is popped from its underground silo by a gas generator, and the first stage ignites once it clears the ground. It is then guided via thrust vector control from the second the booster ignites. Once clear of its silo a thrust vector control system causes the missile to pitch over on an on-trajectory attitude.

The status of the Nike X system is as follows: The MAR has been undergoing operational tests at White Sands for over two years; construction of the second MAR, which will approach a tactical configuration, is under way at the Kwajalein test site; the improved Spartan has a year of development behind it; and flight tests of Sprint are under way at White Sands. The cell eject system, the thrust vector control system, and the design and structure of the missile have proven to be what are required.

Before leaving Nike X, one other aspect should be mentioned. As part of the project, proposals were required treating various defense options for its deployment. Last year, at the direction of the Secretary of Defense, an integrated deployment plan was prepared based on various levels of defense ranging from light attack to massive attack, as well as what levels of attack might reasonably be expected over an intervening period of years and what Nike X requirements would be necessary to counter such attacks. We refer to this as the "building block" concept—a feature of the Nike X system. The decision as to how much to deploy and when has not yet been made by the Secretary of Defense; however, the Army is continuing Nike X development and is ready to implement any decision.

This basically is the entire Nike X picture. It illustrates the requirements for advanced, highly reliable engineering which this sophisticated, highly complex weapon system will place on American industry during the next decade. These requirements include not only those for such initial deployments as may be directed, but also to stay ahead of a dynamic threat, constantly striving for means to penetrate Nike X's protective shield.

Surface-to-Air Missile Development

Another system for the 1970's, for which the Army has high hopes, is one we call SAM–D—surface-to-air-missile development. SAM–D is a possible replacement for both Hawk and Hercules, and is a successor to two earlier study efforts—the Field Army Ballistic Missile Defense System (FABMDS) and Army Air Defense System —1970's (AADS–70).

SAM–D will be oriented principally to the defense of the Army forces in the field against aircraft and short-range tactical ballistic missiles, and would complement low altitude forward area air defense weapons, such as the Redeye, a man-portable, bazooka-type missile. The system will be designed primarily to meet the high performance, air-supported threat, but it will also have a capability against short range ballistic missiles.

The Army's estimate of how this system will be configured is as follows: It will have several tracked vehicles, each mounting either phased array radars with high performance computers or quick-reacting, supersonic missiles. Not surprisingly, the characteristics the Navy seeks are similar to those desired by the Army. An initial evaluation of the requirements of the two systems showed that a common system would not satisfy both Services since there are differences in the environment in which each would operate, as well as differences in operational concepts. However, the Army and the Navy will make a maximum effort to develop common components, as well as to exchange appropriate development data.

The present Nike Hercules air defense system is a semi-fixed one, capable of engaging one target at a time. Hawk, though we are upgrading both its mobility and target-handling capability, is able to engage only two targets simultaneously. With SAM–D we will have a highly mobile system of greatly increased target-handling capability, flexibility and less operational cost. As presently conceived, SAM–D would be the principal tactical air defense weapon for the 1970's. Its development and production will present real challenges, not only to research and development scientists and engineers, but also to production experts. It, too, like any major weapon system development, will cost money, probably several billion dollars if deployment both in the United States and with the Army in the field is directed.

The Helicopter and Air Mobility

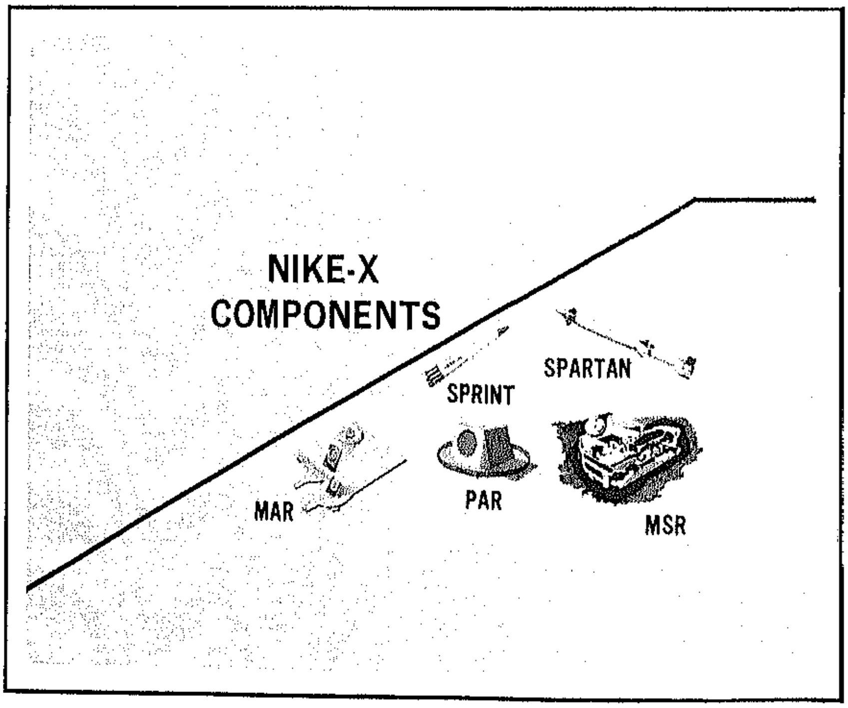
An area more directly related in the Army's present research and development program is the development of future Army aircraft and associated equipments.

The advance of the helicopter, both technologically and operationally, to meet the challenge of our present commitment in Southeast Asia is now a well established fact. It goes without saying that the helicopter and Army air mobility have really come of age in the past decade with Vietnam as the proving ground.

As a history major, I am one of those who believe that military operations, both strategic and tactical, have been guided by certain fundamental principles. All the great captains from the days of Alexander and Hannibal have been guided by them. Mao Tse Tung and General Giap may wrap them in communist batter, but the Viet Cong, too, are guided by them. The successes which they have achieved are largely attributable to their able application of those principles which favor guerrilla operations—surprise, economy of force, rapid maneuver to mass overwhelming force against the selected objective. With his knowledge of the countryside, his ability to melt into the background, his ability to interdict normal ground lines of communication by mines and ambush, in the past the guerrilla was fought essentially by an overwhelming preponderance of force—until the advent of the helicopter. As is well known, the Japanese and Germans had to commit up to 10 times the force to keep their lines of communication open in China and Russia during World War II.

With the helicopter's ability to deliver fresh forces quickly and mass them rapidly, the counter-guerrilla forces have been able to exploit the guerrilla's preferred principles of war against him, particularly those of mass and maneuver.

In a way, these two principles can be related to the physical sciences in a rather elementary sense by the use of Newton's Second Law. The force brought to bear in combat can be equated to the mass times the acceleration or momentum of the troops committed. This may be a rudimentary analogy; however, it serves to emphasize the importance of speed in military operations. The strategy of Napoleon's campaign was highlighted with two key tactics: the massing of his forces and the rapidity of his movements, the speed of which Jomini more than once compared to lightning and which led the



French soldiers to remark in 1805, "The Emperor has invented a new method of waging war; he makes use of our legs instead of our bayonets."

Today the U.S. Army is crossing the threshold of a new era, an era of fire and maneuver in which we are capitalizing on what technology can contribute in moving our soldiers and firepower rapidly through the air to close with and destroy the enemy.

In this century, we have seen major progress in all areas of technological advancement and, in the interest of the national defense and the security of the free world, the military is pacing itself with this technology. In the area of firepower the U.S. Army has made dramatic progress since the days of the pack howitzer. Artillery has always accompanied the infantry, but it was a cumbersome process to mount, dismount and reassemble the ever-needed fire support for the horse cavalry.

Today in Vietnam, artillery is moving in a far more efficient manner. By means of the helicopter, lightweight 105mm howitzers move to the scene of battle at speeds surpassing that of bombers in World War I. Being an artilleryman myself, I can fully appreciate the efficiency of moving tubes in this fashion—over jungles, mountains, and rivers, unimpeded by terrain in providing timely, accurate, sustained fire support for the ever-moving infantry.

We look to industry to help us achieve still greater mobility in the next decade. This will not, however, be merely by providing more and faster wings. It must also come from improved aerial means to survey position and target areas accurately; to provide current, accurate, ballistic, meteorological data over wide areas; and an ability to acquire, identify, locate and mark targets quickly and accurately, rain or shine, day and night.

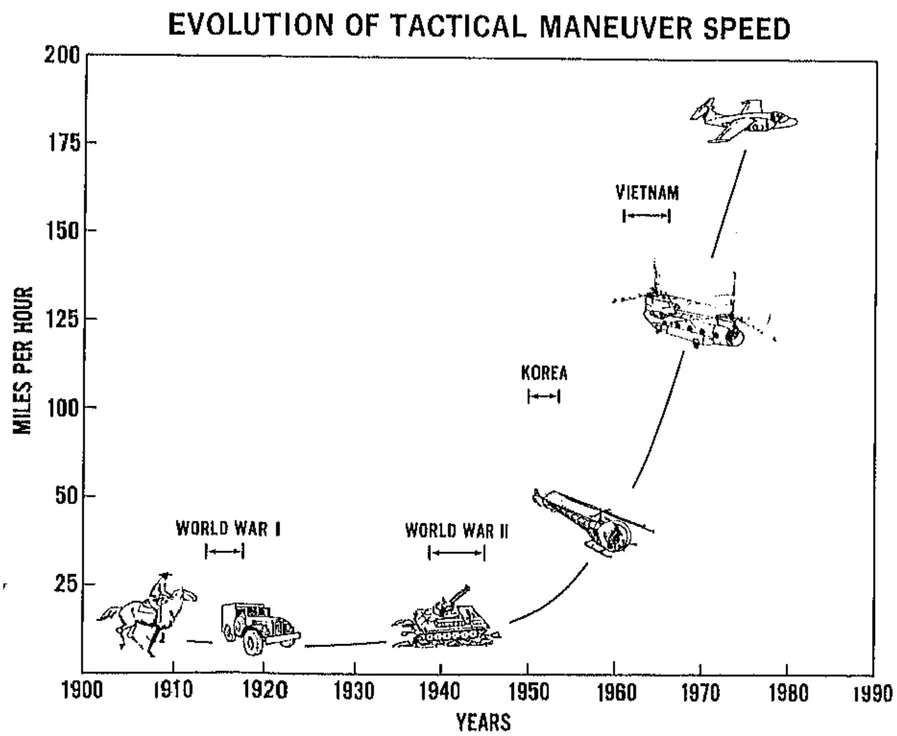
Though primarily designed for security and escort of troop-carrying helicopters, the armed helicopter has come a long way towards proving the value of aerial artillery and enhancing the attractiveness of such a concept. When it was initially determined that an armed helicopter was a necessity, the Army began to improvise and adapt ground weapons to the helicopter by means of extra booms, braces and struts. The standard M-60, 7.62mm, light machine gun of the infantry found its place in the doors and on the sides on Army helicopters. The relatively new and highly effective infantry 40mm grenade was brought into use by the installation of a grenade launcher turret on the chin of the UH-1B Iroquois. For greater punch, the familiar 2.75 inch folding fin aerial rocket and 20mm automatic guns were adapted to hard points on the now bristling sides of the UH-1B. The XM-21 system, comprised of 7.62mm machine guns and a rocket pod, was provided to give the helicopter a real "one-two" punch.

These weapon systems offer us a much needed, direct fire support capability that forces the enemy to keep his head down for those critical moments between the time the Air Force tactical aircraft finish their bombing and strafing runs, and the time when the troop ships touch down in the landing zone. Time and experience, as expected, showed that deficiencies accompanied the transformation of a utility helicopter into an armed escort vehicle. The result was a degradation in both weapons and helicopter performance. With weapons installed, the speed of the UH-1B dropped below the cruise speed of the troop ship it was escorting.

As an interim solution to this problem, the Army is moving to a more extensively modified UH-1, the AH-1G, popularly called the Cobra. This interim armed helicopter will offer numerous improvements over its predecessor and will bridge the gap between the cobbled-up armed helicopters of the 1960's and the fire support systems of the 1970's.

The next decade will find the Advanced Aerial Fire Support System (AAFSS) performing the escort and direct fire support mission with a design that capitalizes on advanced helicopter technology and represents the latest in the state of the art. Now in engineering development, the AAFSS, or AH-56A as it has been designated, is a two-place compound helicopter, featuring a rigid rotor, stub wings, and a tail-mounted pusher propeller for auxiliary thrust. It will cruise at speeds in excess of 200 knots and offer the stability and control essential for an aerial weapons platform.

In this regard, the AAFSS will carry a wide array of weapons, to include various calibers of machine guns, rockets, a grenade launcher, the TOW anti-tank missile, plus an integrated target acquisition and fire direction system using the Integrated Helicopter Avionics System (IHAS).



The armor protection for the crew and vital components of the aircraft will represent a major advance in passive defense hardware. The development contract with Lockheed-California Co. provides for design, fabrication, flight test and delivery of 10 of these systems to the Army before 1970.

Although fire support is an essential ingredient in combat, the battle is never won until the infantry is on the objective. At the turn of the century, our Army moved its men about the battlefield on foot and on horseback. In September 1914, General Joffre enlisted the taxicabs of Paris to rush two regiments of reinforcements to the front during the battle of the Marne. This action represented the first movement of troops to a battlefield by motor transport. Three years later when the U.S. expenditionary forces moved to the front, long columns of truck convoys were a common sight.

From these primitive beginnings, we have vaulted in half a century to the point where today in Vietnam waves of UH-1D, utility tactical transports, take off in the early hours bound for an objective miles from base camp. Enroute, the door gunners keep a keen eye out for hostile forces and return fire as necessary. Shortly before the "slick ships" carrying the assault troops arrive in the landing zone, their armed escorts place discrete suppressive fires on known or suspected Viet Cong positions using the weapons described earlier. As the gun ships pull up and shift their fire, the slick ships touch down and deliver the troops into the heat of battle, fresh and well prepared to do combat. As the high ground is secured and communications are established, the CH-47 Chinooks arrive with follow-up troops and the heavier equipment. Thirty minutes before, these troops were receiving their final briefings and attack orders, 30 or 40 miles away through jungles or mountains that would have required days to traverse.

Our experience has clearly demonstrated the necessity for our transports, as well as our fire support ships, to be able to land and take off from otherwise inaccessible terrain. For example, in Operation Masher/White Wing against the Viet Cong, the 1st Cavalry Division completely surprised the enemy by seizing the high ground and attacking down hill. Quite a change from Grant's famous assault up Missionary Ridge.

Air Mobility of the Future

This is air mobility today. But what of tomorrow? Can this be improved upon? The answer is most certainly yes.

When compared to the aerial vehicles of tomorrow, today's helicopters can be considered, relatively speaking, as sophisticated as the taxicab army of 1914. Mobility has affected the tactics of the 20th century profoundly, and will most certainly continue to do so. In 1900, movement of men and material was limited to the speed of the man and the horse. In World War I, this speed began to give way to the truck's. World War II brought with it the mechanization of the artillery and the real firepower, mobility and shock action of the tank. Then came the mechanization of the infantry. Korea saw the helicopter as a fledgling that could survive in the heat of battle.

Over these years, the speed of maneuver has constantly increased with a pace matching that of science and technology. Within the next decade, it may not increase as exponentially but the slope will certainly be positive.

What is to take the place of today's UH-1's and CH-47's? Our thoughts in this regard revolve about what technology holds for improved vertical rising machines. Army aircraft of tomorrow, such as the new Utility Tactical Transport (UTT) System or Light Tactical Transport (LTT) System, must be selected through a careful iteration process whereby the doubts as to reliability, complexity and relative survivability have been minimized, if not eliminated altogether.

In order not to leave any stone unturned, we must attempt to breach the gap between the narrow bands of V/STOL and pure helicopters. It has long been recognized that the helicopter with its relatively low-disc loading is the most efficient hovering machine, while the simple fixed-wing has the most efficient lift-producing system for cruising flight.

For this reason, the Army composite research aircraft program is investigating how to marry the best of each in a single aircraft. To accomplish this, rotor drag must be reduced by unloading or altering the mode of operation of the lifting rotors so that their drag is minimized. In the cruise configuration, lift is transferred to conventional, winglike lifting surfaces and the rotor is stopped, stowed, or tilted. The application of such concepts should provide aircraft of significantly greater productivity, increased range, reduced logistics requirements and lower noise levels.

Brig. Gen. John R. Guthrie, USA, is Director of Developments in the Office of the Chief of Research and Development, Department of the Army. From July 1965 to March 1966 he was assigned to the Requirements and Development Division, J-5 Directorate, in the organization of the Joint Chiefs of Staff. He is a graduate of the National War College and holds a Bachelor of Arts degree from Princeton University.

The Army composite aircraft program is being accomplished in three steps: the preliminary design study phase completed in June 1966, an intermediate component and model fabrication and test effort in 1967, and culminating with the fabrication and test of full-scale research aircraft.

A design competition in November 1965 resulted in contract awards to Bell Helicopter, Hughes Tool, and Lockheed-California for the study and formulation of a follow-on program including the design, fabrication, instrumentation and test of a composite aircraft.

The Lockheed version utilizes a stopped and folded main rotor, nacelle-mounted propellers and engine, and a conventional anti-torque tail rotor.

In the cruise mode, the 60-foot main rotor is stopped, folded and trailed aft in a horizontal position.

The Bell proposal is essentially a high-wing airplane having a tilting prop-rotor mounted on each wing tip.

The Hughes hot-cycle rotor wing utilizes a dual purpose lifting device that is basically a hot-cycle rigid rotor with an unusually large hub. It acts as a tip-powered rotor for the hover mode and is stopped to become a low aspect ratio fixed wing for the cruise mode. The basic propulsion system is a turbojet gas generator in combination with diverter valves which direct the exhaust gas either to cascade nozzles on the rotor or the tailpipe.

For purpose of configuration analysis and future flight tests, these aircraft are to accommodate a 3,000-pound payload with disc loadings of 10 pounds per square foot or less, hover out of ground effect at 6,000 feet/95 degrees, and cruise at speeds between 300 and 400 knots.

Studies by the three competing contractors were submitted in June 1966 and subjected to detailed review and analysis which resulted in contract awards to Lockheed and Bell to pursue the stopped/stowed rotor and tilt prop/rotor, respectively, through the second phase. A decision on the concept which will proceed to the detail design, fabrication and flight test of full-scale aircraft could be made later this year with first flight as early as 1970. The composite research aircraft has high potential for major advancement in rotary wing technology for application to future military aircraft.

From this effort we expect to learn where we should go design-wise to provide the UTT's, the LTT's and the heavy lift helicopters which will replace our current UH-1 Iroquois, CH-47 Chinook, and CH-54 families during the next decade.

When you consider that there are over 1,900 helicopters in Vietnam today, the importance and magnitude of the research, development, test, evaluation and production programs to replace them is apparent. It is hardly necessary to add that, to be cost effective, they must truly represent major advances in performance, reliability, maintainability, and what might be called, tactical productivity.

In the heavy lift area the 1960's saw the introduction of the CH-54 Flying Crane into the Army inventory was delayed for some time as people debated the requirement for heavy lift. Now, the CH-54, with its 10-ton lift capacity, has proven its versatility in the heat of combat. It has recovered downed aircraft valued in the millions of dollars. It has served to move heavy artillery and oversize loads otherwise unmanageable with medium and utility transport helicopters. Although not the optimum desired by the Army, the CH-54 has served to validate the requirement and point the way to even greater recognition of the unplumbed potential of the helicopter.

As troop mobility increases, the requirement to move their heavier equipment becomes even more pronounced. Helicopter payloads in the 18- to 20-ton range will soon not only be desired, but essential. This capability must be achieved without any loss of the flexibility and agility of today's machines.

Tomorrow's aircraft will be subjected to far more vigorous usage than those of today; therefore, our requirements will become more demanding. Maintainability and reliability standards are increasing to the point where we will expect the helicopter to be as dependable and easy to maintain as the jeep. Where aircraft availability today is 50–80 percent, tomorrow availability should go to 90 percent. With the introduction of advanced state-of-the-art engines, horsepower-to-weight ratios should increase with an associated decrease in specific fuel consumption.

Dynamic components and other time-change items must have extended life, and adverse environmental conditions, such as dust, heat and humidity, should not hamper performance or longevity. Above all, the vehicles must be capable of living in the field with the troops they support. Sophisticated maintenance will be the exception rather than the rule.

These requirements may seem optimistic, but the rigid specifications for the light observation helicopter required an unprecedented maintenance-to-flight-hour ratio of less than one and it was achieved. We must seek comparable standards for our other systems. Items on today's wish list will be tomorrow's project data cards and 1970's contracts. Industry and the Army must strive together to make them a reality.

I hope that these paragraphs will provide an insight not only into our past and present, but primarily our aspirations for the future. The Army was better trained and prepared tactically, organizationally, doctrinally, and equipment-wise for the war it is fighting in Southeast Asia than ever before in our history. With your help we intend to be even better prepared for whatever we may face in the next decade. However, in case anyone is perplexed as to why we haven't moved quicker or done some of these things earlier, this thought bears consideration. If the earth's history could be compressed into a single year of 12 calendar months, the first eight months would be completely without life; the next two would see only the most primitive creatures. Mammals wouldn't appear until the second week in December and homosapiens until 11:45 p.m. on Dec. 31. The entire period of man's written history would occupy the final 60 seconds before midnight.

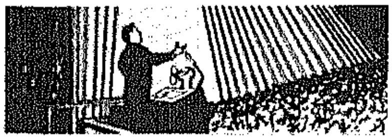
So, as we approach midnight and prepare to move forward into the 1970's, we should be thankful that we are here to step over this threshold. The prospects are even more challenging today than ever before, and our generations are serving as catalysts for the future.

AF Awards Study Contracts for A–X Aircraft

The Air Force has awarded four-month study contracts to four aircraft companies for preliminary design and other studies of the A–X specialized close air support aircraft.

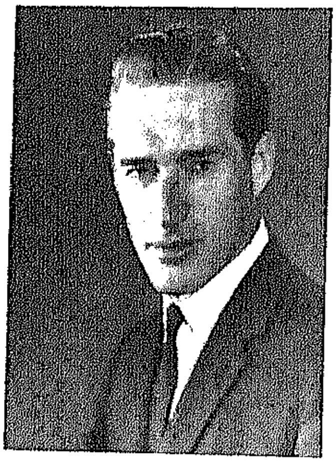
Contracts were awarded to General Dynamics, Convair Division, San Diego, Calif.; Grumman Aircraft, Long Island, N.Y.; Northrop Aircraft, Hawthorne, Calif.; and McDonnell Aircraft, St. Louis, Mo. They were awarded by Air Force Systems Command's Aeronautical Systems Division, Wright-Patterson AFB, Ohio.

The study contracts are part of the concept formulation phase of aircraft development. Military need, concept of operation, feasibility, cost and best characteristics of a new aircraft are defined and analyzed under the contracts.



FROM THE SPEAKERS ROSTRUM

Address by Hon. John S. Foster Jr., Dir. of Defense Research and Engineering, at the Annual Meeting of the Aviation Space Writers Assn., Las Vegas, Nev., May 18, 1967.



Hon. John S. Foster, Jr.

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I turn now to my major purpose today: to explore a few areas of defense research and development which show the relationships between our work and yours.

I suppose it is now regarded as a transparently obvious axiom in any national policy discussion that national security—understood deeply—is a subtle balance of military, political, economic and technical factors. The significance of research and development in the strength and security of nations is unmistakably great. Further, the pace of modern technology—both ours and that of others—will continue increasingly to complicate all considerations of U.S. national security strategy.

In assessing the broadest implications of new technology and advanced weapon systems, there is, as I see it, a coincidence of our viewpoints. We in the Defense Department are as committed as you are to contributing to an accurate public discussion of the choices in national security. Surely there was no question in the 1950's about the vital service to the country when journalists, scholars and governmental spokesmen explored—sometimes heatedly—the impact of the intercontinental ballistic missile on the choice of strategic courses open to the United States and the Soviet Union. Surely there is no question today, for example, about the value of an informed, broadly based public analysis of anti-ballistic missile systems or of the spread of nuclear weapons.

National security demands continuing debate.

The vital importance of national security demands that our country have continuing, intense debate on the critical issues. This is, in fact, an international imperative as well. As you realize, the recent U.S. efforts to extend discussions of missile defense with the Soviet Union are based upon the premise that greater international understanding of these issues is necessary in the path of peace.

But again, make no mistake about the nature of these issues. They involve technical as well as political and economic elements. Too often, the technical facts, and particularly the range of uncertainties, are not treated adequately in publications. I suggest this inadequacy is not primarily the result of excessive secrecy but rather of our mutual failure to complete the discussion. All of us must contribute more here.

Let me turn now to our continuing, most critical area: research and development in our strategic systems. The overriding operational objective of our strategic programs is the deterrence of nuclear war. Mutual deterrence is, in fact, the only meaningful way a nuclear war can be "won" by both sides. Deterrence rests on the capability for assured destruction of the enemy's military, industrial and civilian base. A deterrent capability is characterized by three essential factors: assured survivability, penetration and control.

Our strategic offensive forces must be able to survive a surprise attack and still be capable of inflicting unacceptable damage. This assured survivability is achieved, in part, by a mixture of systems and techniques, land-based bombers, land-based missiles and sea-based missiles.

Surviving would not be sufficient if, after arriving at targets, our weapons were rendered impotent by defensive systems in the terminal area. They must be able to "penetrate" the defense, to strike the target. Penetration is achieved in essentially two ways: by brute force, through the use of overwhelming numbers to exhaust the defense; and by deception, such as through the use of decoys.

Finally, our strategic systems must be flexible and remain under our reliable, positive control. We cannot risk a response triggered by accident or false alarm.

Our record in achieving an adequate deterrent has been impressive, in quantity and quality. Our ability to deliver an overwhelming retaliatory strike, even after absorbing a surprise attack intended to paralyze our strength, is unquestionably convincing.

Now, you are saying to yourselves, we have heard all this before. But let us pause here a moment. I have emphasized the word "assurance" in reviewing our strategic objectives—assured destruction of any attacker, assured survivability, assured penetration, assured command and control. This is a crucial concept. It is crucial that we devote the highest priority to our thinking about assurances—and we do. It is crucial that we assign all necessary resources and great talent to maintaining and upgrading these assured capabilities—and we do. And it is crucial to our national security that the press not take this concept lightly.

We know it is essential to explain—clearly and openly—to any potential enemy the nature of our capability. The whole point of "assurance" is that

everyone must appreciate the certainty and capability of our response to any major attack. Nevertheless, occasionally, there is an oversimplified "scare story" claiming that our deterrent force is in some way grossly inadequate. Such stories cannot be supported—either technologically or operationally. Such stories introduce unwarranted uncertainty, here and abroad. Such stories undermine the credibility of our deterrent. Because such stories cannot be supported, they are a great disservice to the country.

We go to great lengths to state the general facts about our assured strength. Yet some information must remain classified. Often this is a difficult line to draw—the line between what should be said to maintain credible assurance, and what should be left unsaid to ensure security; the line between what skeptical Americans want and need to know in an open society, and what a potential enemy wants to know to design effective countermeasures. For example, nothing is gained by disclosing design details of our penetration aids. Disclosing such data would not support our national purposes. It would only assist any potential enemies.

I want to clarify an important aspect of our thinking about assurance. The concept of assurance spans a complex interaction of the offense and defense. How does one know, for example, that an offensive capability is "assured" unless one has great confidence in his understanding of advanced defenses? This is precisely the thrust of our analysis. We develop the technology for the most advanced missile defense, and then we design our offensive missile systems to penetrate that defense. We develop the most advanced air defense technology, and then we design our aircraft systems to penetrate that defense. In general, we have been one to two technological generations ahead of any potential enemy in these advanced designs. So we have great confidence that our offensive forces are "assured." From this experience we have found that the offense has dominated the defense, and we expect this trend to continue in the foreseeable future.

Now I want to discuss a difficult point, raised semi-annually in discussions of our strategic capability: the so-called "technological plateau." I occasionally hear the argument that we have reached, or have somehow accidentally been trapped in, or have decided to remain on, a "technological plateau." The allegation usually is either that we are not really pushing important new developments, or that we are not concerned about possible developments of potential enemies. I can say categorically that this argument is not valid in terms of any criterion I think is important. But I must say, before going further, that if you feel a key criterion has escaped our notice, please bring it to my attention. To set the record straight, let's look at this from several points of view.

Is there a technological plateau?

First, let me give you examples refuting the funding fallacy often implied. In FY 1968, we are continuing our ballistic missile defense development efforts at the high levels of recent years. We are requesting $440 million for research and development work on the Nike-X system. And there is another related program in the Advanced Research Projects Agency, Project Defender, for which we have requested another $119 million. Our capabilities in this area have changed dramatically in the last 10 years. How can we be stagnating technologically in ballistic missile defense while we devote more than a half-billion dollars to it in one year?

Also in FY 1968, we are requesting about $350 million for programs on our Minuteman forces and about $433 million for the Polaris/Poseidon developments. These funds support some of the efforts necessary to demonstrate that we know how to penetrate any enemy's missile defenses.

Overall, let me remind you, DOD expenditures for research and development have increased almost 300 percent during the last decade. The research and development budget requested for FY 1968 is $8.1 billion. It contains requests for over 1,500 projects. The real argument here, I suspect, is not about the total. Most people seem to agree we're spending the right amount. The real arguments are about specific items, each of which always—always—has its advocates. So the problem is to achieve some balance, some sorting out of priorities and prospects. This requires judgment, and I would be the last to claim we have attained perfect balance. I think we do have about the right total.

So much for the charge that we are not really investing the required money. But how about the argument that we are not aggressively pursuing the frontier fields of defense technology? I don't think this is true. Here, too, are the difficult questions of balance.

For example, how does one know whether $1.4 billion this year for the DOD research and technology base is adequate? And how does one know whether we have the right balance between this base and our development projects which are funded at about $4.8 billion? Actually, these totals and ratios are merely the sum of thousands of numbers, each examined and set on its own merits. I know of no clearly needed improvement and no clear technological opportunity that do not receive adequate support. Probably more important we are not content with our past and current success. We continue to press the state of the art in every technical area in which there is a solid case for providing required improvements in our forces.

Thus I am puzzled by the occasional essay on defense research and development which simply ignores the enormous effort we continue to devote to advanced technology. Perhaps it is understandable that some pockets of misunderstanding will exist because, as I've said, we have been compressing great clusters of advanced work into a single year's effort. This situation is somewhat analagous to that assessed by Tom Lehrer, the mathematician turned singer/satirist, when he cracked, "I am sobered occasionally to recall that when Mozart was my age, he'd been dead 10 years!" I, too, am sobered to read the altogether plausible prediction that half of what a competent engineer will need to know 10 years from now is not available to him today!

One final aspect of this alleged technological plateau: the argument that we are in some way losing our strategic superiority.

For many years, the Soviet Union apparently has been following our

lead in every important strategic system technical development: the intercontinental bomber, the solid-fueled missile, the Polaris-type submarine, the hardened and dispersed silo, and many other advances. This is still the case. We are following their activities with great care. We see no evidence that our planned strategic capabilities will be endangered by recent Soviet technological actions.

Our missile force represents a fully operational, reliable, survivable and, again, assured deterrent. Our missiles are more accurate. We have developed a family of penetration aids. The changes that we have made in our missile forces—Minuteman II, and soon the addition of Minuteman III and Poseidon—are much more than minor modifications and name changes. These new capabilities provide major increases in effectiveness. Our bombers are capable of low-altitude penetration over a target area. We will soon have a bomber with enhanced area penetration capability, equipped with stand-off missiles so that it can also avoid terminal defenses.

I am often asked how long we are going to keep one of these strategic systems. The answer is simple: as long as it can provide assured destruction.

In advanced technology, we have developed the capability, if required, to move rapidly into operational development and deployment of several new systems, such as an Advanced Manned Strategic Aircraft (AMSA) and an Advanced ICBM. These new concepts are waiting in the wings, not because we have avoided or failed to invest in the advanced technology necessary for strategic advantage. It it because, at the moment, immediate deployment is not yet clearly in the overall national interest.

Strangely enough, we sometimes get credit for a breakthrough we haven't made or get blamed that, if we haven't made it, the Soviets have. A number of recent articles "discovered" X-rays as a kill mechanism at high altitude. Depending upon the point of view of the author, either the United States has made this breakthrough, or the United States is behind in countering some Soviet threat based upon this X-ray threat. Neither the "pat on the back" or the "jab in the ribs" stories are true. One could read about these X-ray effects several years ago in unclassified official handbooks on nuclear weapons effects. Anyone working with nuclear weapons exploding above the atmosphere must either exploit, or protect against, such effects. We have had, and continue to pursue, major research and development programs designed to minimize the susceptibility of our systems to such kill mechanisms and, at the same time, to maximize their effectiveness in developing ballistic missile defense. The details must remain classified. An isolated speech or a paragraph in congressional testimony does not make this "new." I admit it can be "news," albeit news with an available background of fact.

Let me try to summarize my views on the matter of technological plateau. We know that research and development is "worth it"—in hard economic terms as well as in strategic terms, and in fulfilling normal military functions as well as in creating entirely new capabilities.

There is no stagnation in defense research and development. There is no technological plateau now. Nor do I think there will be one created, either accidentally or by design. You can help us by resisting any temptations to re-enforce the myth of a technological plateau. There are times when my job and yours may lead to conflict. But a controversy about a technological plateau is simply a false conflict based upon misinterpretation.

Vietnam conflict calls for quick-reaction projects.

We have looked briefly at research and development related to strategic systems, and a few problems in public discussion of these systems. Let's look now at a rather different topic: the role of research and development to support the conflict in Vietnam. The most important single focus in defense research and development today is on meeting, wherever possible, the research and development needs revealed by that conflict.

Each spring, as you know, we have opportunities to appear before the Congress to present and explain our budget request. Congressmen, like reporters, have a way of asking direct, penetrating, and important questions. One of the most striking questions this year was: Why do we show roughly the same research and development budget request in FY 1968 for the manned orbital laboratory and for our total research and development effort for Southeast Asia? An attempt to answer this single question may be helpful to you.

There are some simple answers. First, we cannot project our Southeast Asia research and development requirements very far in advance because so many of them are quick-reaction projects. In this fiscal year, for example, we initially budgeted about $400 million. Subsequently, the Services reprogrammed almost $100 million more, and received approximately $200 million more from emergency and supplemental funding. Thus the budget was increased from $400 to almost $700 million during an 18-month period in which urgent research and development needs developed. The same evolution may occur during FY 1968.

Second, some of our research for limited warfare simply isn't expensive. For example, the research and development required to develop a new jungle boot, specially tailored to the hot, moist climate of Vietnam, cost less than half a million dollars. The country has spent many times that much for the astronauts' flight gear. Both the soldier and the astronaut have to be properly equipped for their jobs. We need them both, and the dollars fall where they must.

Third, general purpose forces have been under development for hundreds of years, while the first astronaut flew four years ago. Hence much of our current tactical warfare research and development is devoted to achieving relatively small improvements to existing hardware. Two years of combat have demonstrated beyond question that our troops were well trained and excellently equipped from the outset.

These are a few of the simple reasons why we are not able to spend more. But there are other, more fundamental reasons.

General Maxwell Taylor has characterized the Vietnam conflict as limited war with limited objectives, limited resources and, hopefully, limited risks. I would like to add one more restraint: limited applicable

technology. If there is one indisputable feature of the Vietnam war, it is that a "technology fix" alone will not solve our problems. The hard-core problems are essentially political, social and economic. The solutions to these problems will not be found in the products of research and development. Nor will it help to invoke any mythology about the potential of research and development.

I must add, of course, that there are some key problems in Vietnam which research and development should be able to solve. If solutions can be found to these problems, not only might the war be shortened but our capability to deter other such limited wars would be greatly strengthened.

At this point I would like to remind you of a somewhat under-publicized aspect of the war. General Westmoreland has been extremely eager to innovate, to press the concept of "combat research and development." To assist this process, I assigned two distinguished defense scientists to act as personal advisors to Admiral Sharp and General Westmoreland. Dr. William McMillan is in Saigon, and Dr. Thomas Cheatham is in Hawaii at the headquarters of the Commander in Chief, Pacific. To provide coordination of all our Vietnam-related research and development, I also established a new office within my staff, the Deputy Director for Southeast Asia Matters, and appointed Mr. Leonard Sullivan to this job. The splendid and critical contributions of these three men are a reflection of the entire research and development community's involvement.

We have had many research and development successes in Vietnam. But I think I should give you, in the interest of candor, a sampling of the research and development problems emerging from Vietnam which we still don't know how to solve.

- We are still looking, for example, for a satisfactory way to find tunnels. If we could reliably locate tunnels, we would be well on our way to cracking the Viet Cong's principal resource for command, logistic supply, and escape.

- As another illustration, many of our casualties are caused by primitive mines and booby traps. These are often made from our own dud munitions, sometimes even from our cast-off ammunition boxes. We would like a device capable of sensing explosives and/or metal wires and fragments about 100 yards away that one man can carry along with other combat gear. This same device might be useful in warning of impending ambushes—another serious and deadly problem.

- The Viet Cong are masters at the art of infiltration—not just across the borders into South Vietnam, but into our military bases, local outposts and villages where they practice the diverse techniques of terrorism. To meet this threat, we need much better ways to differentiate friend from foe. And we must find reliable "burglar alarm" systems to warn of approaching or passing danger. Like the other needs I have mentioned, the successful development of simple "border security" systems and "people-detection" devices will have spin-off benefits far beyond the scope of the present war.

We have not yet solved these problems. Do they sound impossible? How does it sound when I ask you to dig a little trench on the moon? Do you think these problems are not being solved because of a lack of money? I don't think that's the reason. I think it is because we don't know how to spend more money sensibly. This is a tough answer to give a Congressman and a reporter. But it's true.

These problems are perhaps best attacked by interdisciplinary teams of physical and social scientists. Any turning point in Vietnam will depend upon careful discrimination, analysis and, then, change in the social and physical environment. Obviously, we need to employ all of our skills to get to the point where, instead of counting killed Viet Cong, we will be counting live, independent, self-governing citizens.

As pointed out in my congressional statement, we in research and development must heed Santayana's warning that those who don't understand history are condemned to repeat it. We are trying to learn the lessons applicable to research and development activity. It would be irresponsible not learn these lessons. You can help us here by reaching for the careful and complete story, distinguishing between the various kinds of research and development problems.

"Man-in-the-System."

Let me turn now to two examples of areas in which we clearly need growth over the long-term future. I will sketch our thinking about goals for what is called "man-in-the-system," and for our research and technology base.

A key problem now recognized more clearly as a major direction for future research and development is really a cluster of problems pertaining to people. The Defense Department is many people: pilots, infantrymen, intelligence officers, commanders, raw trainees, computer operators, research and development professionals, managers, and on and on. And all of these people participate in "the system." But too often our systems do not really fit the man.

We are beginning to expand efforts in education and training; in human factors engineering; in manpower analyses for all equipment in advanced research and development; in improved equipment for the individual soldier's vision, fire-power, protection and mobility; and an improved understanding of the environmental conditions affecting man/machine performance. At some point in the future, as this work succeeds, we will have developed really matched capabilities for men, equipment and the operational environment.

In each of these areas—so easily listed, so difficult to assess adequately—there are millions of people and man-hours and dollars at stake. These are, in many ways, the most important potential payoff fields of the future. Though our data base is limited, our theory limited, I believe the possible improvements are enormous.

The second area of significance for one to two decades from now is Project Themis. As you may know, Project Themis is our new university research program. It is designed to create—using the President's phrase —new academic departmental "centers of excellence." Our goal is to stimulate the development of new university groups, active in defense-relevant basic research, in geographic areas and institutions which have not previously received substantial DOD support.

I regard this program—funded at about $20 million this year and, Con-

gress willing, expected to expand by almost 50 percent next year—as an exciting initiative. In a sense, it is an experiment and we are delighted with the reaction so far.

We received nearly 500 preliminary proposals from almost 200 universities, requesting almost $400 million. Note that the proposal requests amounted to almost 20 times more money than we have available! On balance, the proposals were of high technical quality. By mid-June, we will have evaluated the detailed proposals. We then will begin awarding contracts for about 50 centers, funding each at roughly $200,000 per year, with advance funding to permit schools to make commitments for three years. Our present plan is to add about 50 new centers each year for the next three years. We will begin another round of solicitations later this year.

Based on payoffs from the last 20 years of university research, I am convinced that Project Themis can be successful, and that it merits more attention by you and your colleagues. For this new program is precisely the kind to ensure against any possible technological plateau. Make no mistake—we do not believe that $200 thousand per year can create an institutional center of excellence. But we do know—from experience—that consistent support of able leaders of doctoral-level research can create departmental excellence, and that this, in turn, can catalyze the growth of an institution. We have no intention of reducing our support of existing academic centers of excellence. What we are doing in Themis is broadening and defining our research and technology base to support our future national security.

sclosure of

... I want to touch again on issues central to the role of the press in defense research and development. I have already mentioned some, but would like to return to the tougher ones.

I quoted Secretary McNamara's statement on freedom of information earlier. I wholeheartedly support this pledge for maximum disclosure of unclassified information: to inform the American public, to maintain a clarifying public debate on major issues, to reach the rest of the world, and to remove any doubts in the eyes of our adversaries about our strength and our desire for peace with freedom.

Questions arise, obviously, about the possible release of classified information, and about the classification criteria. It seems to me that a complicating factor is not anyone's failure to appreciate the need for security precautions. It is, in part, the challenge of prying open any kind of secrecy. I believe that all the facts necessary for an informed public discussion are available on an unclassified basis. The problem, I suppose, as James Reston put it recently, is that it is easier to get "a breathless presentation of the news, featuring the flaming lead and the big headline" if you can tag the news as a "secret."

Some people say there is overclassification. They are right. But be careful. Some of this is caused by a conservatism based upon the need to make difficult judgments on national security policy under conditions of uncertainty. Our job is to ensure that the necessary secrecy is maintained. Your job is to educate the public on national security without compromising our security.

I believe that you can and usually do get adequate information. Discretion need not displace truth. And we are, as a nation, indebted to those reporters and columnists who understand these issues and act in the public interest.

There is another, perhaps tougher problem in reporting research and development news. Obvious but often underrated, it is simply the technical complexity and uncertainty surrounding most research and development work.

Frequently one is asked by reporters to give estimates on the performance, costs, schedules of research and development projects. If one hesitates or begs off completely, there is irritation or criticism about excessive secrecy. In my experience, the difficulty is that there simply isn't a good estimate available. Sometimes a complete answer requires a sophisticated set of caveats. However, everybody wants a number which magically resolves their arguments or sells their story. To confess, I do, too. But at times there just isn't a simple answer.

I have touched on limited areas of defense research and development: a few of our objectives, some lessons learned, and common problems. I have tried also to deal squarely with some issues which I thought were sensitive and significant from your perspective.

I approached this occasion with great care, some anxiety, and a good deal of ignorance about your preferences and perceptions. I hope very much that we can maintain a symbiotic rather than a hostile or wary relationship. We have a collective responsibility to analyze some difficult public issues, to serve the public interest, and to report a responsible analysis with integrity. The stakes are very high—national security.

Military Economic Impact

(*Continued from page 3*)

shortage. Examples of these skills are: tool and die makers; machinists; metal workers; forge workers, extruders, pressmen; foundrymen; prosthetics; book binders; engravers; and watchmakers.

Whether this shortage of skilled labor has to do with higher education of our young people, the lack of interest by young people in an apprentice profession, I do not know nor do the job specialists to whom I have spoken. But that acute vacancies have existed in these trades for some time, and are worsening, is not denied. And what is true is that the young people do not fill these vacancies. Doesn't industry have a stake in this?

I think one reacts to economic conflicts by counter moves within stated policy. One holds to competition where possible but assures continuous production. One holds production to effective levels by use of inventory, but assures an inventory for contingency plans. One consumes what is necessary, but gauges consumption to objectives. One uses industrial priorities where necessary but attempts to absorb only that part of production necessary. I can only say to you that it is a fascinating business and, as a business, it has its effects on people. If we can keep our mind on doing the best we can for the greatest number of people, we can sleep at night.

What is industry's answer?

ABOUT PEOPLE

DEPARTMENT OF DEFENSE

Lt. Gen. Leighton I. Davis, USAF, will become Commandant, Industrial College of the Armed Forces, Washington, D.C., on July 1. He is now serving as Commander, National Range Div., Air Force Systems Command.

Maj. Gen. Emmett M. Tally Jr., USAF, has been assigned as Commander of the Defense Industrial Supply Center, Philadelphia, Pa., effective in August. He will succeed Brig. Gen. John D. Hines, USA, who has been assigned as Commander, Defense General Supply Center, Richmond, Va., effective Sept. 1 relieving Maj. Gen. Ray J. Laux, USA, who will retire Aug. 31.

Col. James T. Johnson, USAF, has been named Dep. Dir., Materiel & Services, Defense Communications Agency Planning Group.

Col. McLean W. Elliott, USAF, has been assigned as Asst. Dir. for Ranges and Space Ground Support, Office of the Dir., Defense Research and Engineering.

Col. Robert J. Meyer, USAF, has been named Dir., Aircraft and Missiles, Office of Asst. Secretary of Defense (Installations and Logistics).

Col. John G. Wheelock III, USA, has been designated Dir., European Region, Office of Asst. Secretary of Defense (International Security Affairs).

Capt. Ross A. Porter, (SC), USN, has been named Commander of the Defense Logistics Service Center, Battle Creek, Mich.

Capt. Theodore B. Purvis, Jr., (SC), USN, has been assigned as Dep. Commander, Defense Electronics Supply Center, Dayton, Ohio.

DEPARTMENT OF THE ARMY

Maj. Gen. Harry W. O. Kinnard has been named Commanding General, Army Combat Development Command. Prior to the assignment, Gen. Kinnard served as Dep. Asst. Chief of Staff for Force Development, U. S. Army.

Maj. Gen. Frank J. Sackton, Secretary, General Staff, Army Chief of Staff Office, has been nominated for appointment to lieutenant general and assignment as Army Comptroller.

Col. James P. Luckey, Dep. Commander, Rock Island Arsenal, has been reassigned to the Army Armor Center, Fort Knox, Ky.

DEPARTMENT OF THE NAVY

Adm. Thomas H. Moorer has been nominated for appointment as Chief of Naval Operations. He will succeed Adm. David L. MacDonald who is retiring. Vice Adm. Ephraim P. Holmes has been appointed to succeed Adm. Moorer as Commander in Chief, Atlantic and U. S. Atlantic Fleet, and Supreme Allied Commander, Atlantic.

VAdm. I. J. Galantin, Chief of Naval Material, has been promoted to the rank of admiral in accordance with Senate confirmation designating the position of Chief of Naval Material as a Navy admiral position.

Richard A. Beaumont, Dep. Under Secretary of the Navy for Manpower, has resigned from full time duties but will remain with the Navy for an interim period on a part-time basis until his successor is named.

RAdm. John M. Alford has been assigned as Dep. Commander and Chief of Staff, Military Sea Transportation Service.

RAdm. William S. Guest, has assumed command as Chief of Naval Air Reserve Training with additional duty as Commandant, Ninth Naval District, Great Lakes, Ill.

RAdm. David C. Richardson, has been designated as Asst. Chief of Naval Operations (Air).

Dr. W. Deming Lewis, President of Lehigh University, has been named Chairman, Naval Research Advisory Committee, replacing retiring chairman Garrison Norton.

Capt. James C. Matheson has relieved Capt. Thomas B. Owen as Dir. of the Naval Research Laboratory, Washington, D.C. Capt. Owen has been named the new Chief of Naval Research.

The following captain assignments have been announced by the Bureau of Personnel:

Capt. Eugene F. Anderson Jr., (SC), Commanding Officer, Naval Supply Depot, Philadelphia, Pa.; Capt. Stuart M. Ball, (SC), Commanding Officer, Naval Supply Depot, Seattle, Wash.; Capt. William J. Francy, (CEC), Commanding Officer, Naval Public Works Center, Great Lakes, Ill.; Capt. James W. Montgomery, Commanding Officer, Naval Development and Training Center, San Diego, Calif.; Capt. Julian E. Rawls, Dep. Commander, Navy Weapons Laboratory, Dahlgren, Va.; and Capt. Colin J. Ricketts, Commanding Officer, Naval Missile Center, Point Mugu, Calif.

DEPARTMENT OF THE AIR FORCE

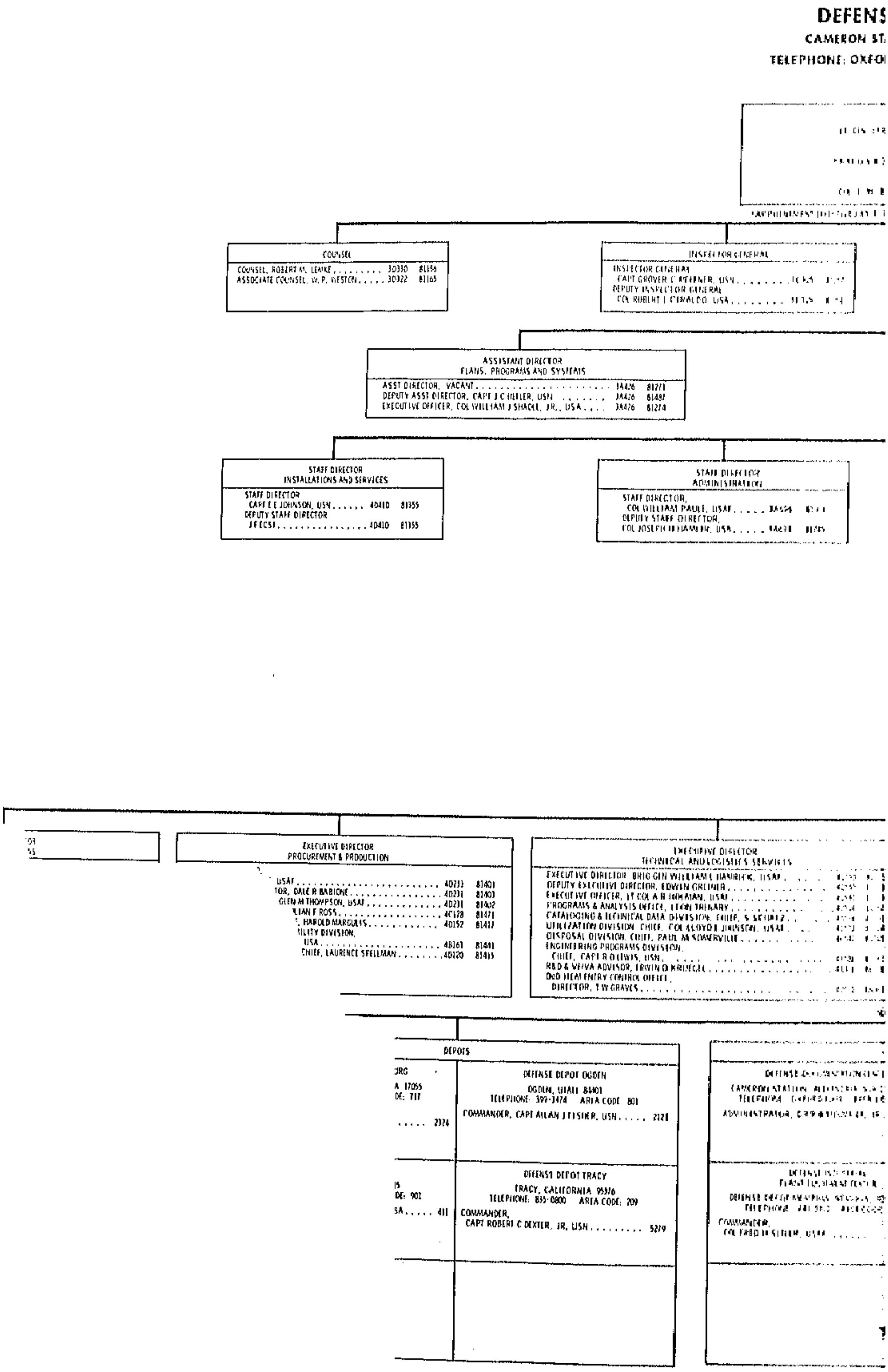
Gen. Kenneth B. Hobson, Commander, Air Force Logistics Command, will retire from the Air Force Aug. 1.

Lt. Gen. Thomas P. Gerrity has been nominated for promotion to general and reassignment as Commander, Air Force Logistics Command. Maj. Gen. Robert G. Ruegg has been nominated for promotion to lieutenant general and assignment as Dep. Chief of Staff, (Systems and Logistics), Air Force Headquarters, relieving Gen. Gerrity.

Lt. Gen. Jack G. Merrell, Air Force Comptroller, has moved to Germany to succeed Gen. Agan as Vice Commander-in-Chief, U.S. Air Forces in Europe. Lt. Gen. Theodore R. Milton, will replace Gen. Merrell as Air Force Comptroller.

Relieving Gen. Milton as Inspector General of the Air Force will be Lt. Gen. Joseph H. Moore, who moves to the Pentagon from duty as Vice Commander-in-Chief, Pacific Air Forces. Lt. Gen. James V. Edmundson will succeed Gen. Moore.

Maj. Gen. Jack J. Catton has been named for promotion to lieutenant general and assigned to relieve Lt. Gen. Robert J. Friedman as Dep. Chief of Staff, (Programs and Resources), Air Force Headquarters. Gen. Friedman will assume duties as Chief of Staff, U.S. Forces Korea and Chief of Staff, UN Command, Korea.



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CHIEF, ROBERT J. FELLERIN 8B318 85541

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MAJOR FIELD ACTIVITIES

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BATTLE CREEK FEDERAL CENTER
BATTLE CREEK, MICH 49016
TELEPHONE: 962-6511 AREA CODE: 616
COMMANDER, COL FRANK MERCER, USAF 6666

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DIRECTOR, COL FRANK A BOGART, USA 405

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TELEPHONE: RI 9-2371 AREA CODE: 214
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BRIG GEN CLARENCE W CLAPSADDLE, JR USA . . . 284

DCSAR ST. LOUIS
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DIRECTOR, CAPT RAYMOND S SULLIVAN, USN . . . 3301

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O'HARE INTERNATIONAL AIRPORT
P O BOX 66475, CHICAGO, ILL 60666
TELEPHONE: 694-3031 AREA CODE: 312
DIRECTOR, COL JOHN F GIBBONS, USAF 2360

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1580 E GRAND BLVD, DETROIT, MICHIGAN 48211
TELEPHONE: 923-0100 AREA CODE: 313
DIRECTOR, CAPT WALTER W TOLSON, USN 201

DCASR PHILADELPHIA
P O BOX 7478, PHILADELPHIA, PA 19101
TELEPHONE: 271 + Ext. AREA CODE: 215
DIRECTOR, COL GERALD JOHNSON, JR USA 2620

MEETINGS AND SYMPOSIA

JULY

1967 Annual Conference on Nuclear and Space Radiation Effects, July 10—14, at Ohio State University, Columbus, Ohio. Sponsors: Institute of Electrical and Electronics Engineers, NASA Office of Advanced Research and Technology, Office of Naval Research, Air Force Office of Scientific Research and the Department of the Army. Contact: Mr. E. E. Conrad, Harry Diamond Laboratories, Washington, D.C., 20438, phone (202) OXford 6-9126.

1967 Summer Seminar on Mathematics of the Decision Sciences, at Stanford University, Palo Alto, Calif., July 10-Aug. 11. Sponsors: Air Force Office of Scientific Research, Atomic Energy Commission, Army Research Office, Small Business Administration, National Bureau of Standards, Office of Naval Research, National Institutes of Health and the National Science Foundation. Contact: Maj. John Jones Jr., (SRMA), Air Force Office of Scientific Research, 1400 Wilson Blvd., Arlington, Va. 22209, phone (202) OXford 4-5261.

Symposium on Electromagnetic Compatibility (EMC), July 18-20, at Shoreham Hotel, Washington, D. C. Sponsor: Institute of Electrical and Electronics Engineers (IEEE). Follow-on DOD Electromagnetic Compatibility Conference, July 20, at Shoreham Hotel with classified session, July 21, at Department of Interior Auditorium, Washington, D.C. Sponsors: Military Services and DOD Electromagnetic Compatibility Analysis Center, Annapolis, Md. Contacts: IEEE Symposium: James S. Hill, 6706 Deland Drive, Springfield, Va. 22150, phone (703) 345-8900; DOD-EMC Conference: Lt. Col. Curtis B. Goodwin, USAF, Chief, Plans and Programs Directorate, ECAC, North Severn, Annapolis, Md. 21402, phone (301) 268-7711, Ext. 8814.

Seminar on Stratosphere and Mesosphere, July 24-Aug. 4., at Stansstead, Quebec, Canada. Co-sponsors: Air Force Cambridge Research Laboratories and McGill University. Contact: H. S. Muench, (CRHB), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01730, phone (617) 274-6100, Ext. 2541.

Earth's Particles and Fields Symposium, July 31-Aug. 11, at Freising, Germany. Sponsors: Air Force Cambridge Research Laboratories, Department of the Army, Office of Naval Research, Atomic Support Agency, and North Atlantic Treaty Organization. Contact: L. Katz, (CRFC), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01730, phone (617) 274-6100, Ext. 3177.

SEPTEMBER

Second Symposium on **Automatic Control in Space**, Sept. 4-8, at Vienna, Austria. Sponsor: International Federation of Automatic Control. Contact: J. A. Aseltine, TRW Systems, Space Park Drive, Houston, Tex. 77058.

International Symposium on **Information Theory**, Sept. 11-15, at Athens, Greece. Sponsors: Air Force Office of Scientific Research, Information Theory Group of the Institute of Electrical and Electronics Engineers and the International Radio Scientific Union. Contact: Lt. Col. B. R. Agins, (SRMA), Air Force Office of Scientific Research, 1400 Wilson Blvd., Arlington, Va., 22209, Phone (202) OXford 4-5261.

International Symposium on **Materials—Key to Effective Use of the Sea**, Sept. 12-14, at the Statler-Hilton Hotel, New York, N.Y. Co-sponsors: Naval Applied Science Laboratory and the Polytechnic Institute of Brooklyn, N.Y. Contact: D. H. Kallas, Associate Technical Director, Naval Applied Science Laboratory, Flushing and Washington Avenues, Brooklyn, N.Y. 11251.

Advanced Composite Structures Symposium, Sept. 19-21, at Hilton Hotel, Denver, Colo. Sponsor: Air Force Materials Laboratory. Contact: Mr. Tomashot, (MAC), Air Force Materials Laboratory, Wright-Patterson AFB, Ohio 45433, phone (513) 253-7111, Ext. 55317.

Eighth Symposium on **Physics and Nondestructive Testing**, Sept. 19-21, at Dayton, Ohio. Sponsor: Air Force Materials Laboratory, Wright-Patterson AFB, Ohio 45433.

Joint **Power Generation** Conference, Sept. 24-28, at the Statler-Hilton Hotel, Detroit, Mich. Co-sponsors: Institute of Electrical and Electronics Engineers and the American Society of Mechanical Engineers. Contact: Carl Shabtach, General Electric Co., Schenectady, N.Y.

Fourth International Conference on **Atmospheric and Space Electricity**, Sept. 29-Oct. 6, at Lucerne, Switzerland. Sponsors: Air Force Cambridge Research Laboratories, Army, Navy, National Science Foundation and National Aeronautics and Space Administration. Contact: M. B. Gilbert, (CRTE), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01731, phone (617) 274-6100, Ext. 3633.

OCTOBER

Twenty-second annual **Transportation and Logistics** Forum, Oct. 3-6, at the Biltmore Hotel, Los Angeles, Calif. Sponsor: National Defense Transportation Association. Contact: Les Richards, 3416 S. La Cienega Blvd., Los Angeles, Calif. 90016.

Conference on **Reinforced Metal Matrix Composites**, Oct. 10-12, at Wright-Patterson AFB, Ohio. Co-Sponsors: Air Force Materials Laboratory and the University of Dayton.

Eleventh Annual **Organic Chemistry** Conference, Oct. 12-13, at Natick, Mass. Sponsors: National Academy of Science-National Research Council, Advisory Board on Military Personnel Supplies, and Organic Chemistry Laboratory, Pioneering Research Div., Army Natick Laboratories. Contact: Dr. L. Long Jr., Head, Organic Chemistry Lab., (PRD), Army Natick Laboratories, Natick, Mass. 01760, phone (617) 653-1000, Ext. 414.

Conference on the **Exploding Wire Phenomenon**, Oct. 18-20, at Boston, Mass. Sponsor: Air Force Cambridge Research Laboratories. Contact: W. G. Chace, (CRFA), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01730, phone (617) 274-6100, Ext. 4926.

Over-Classification Increases Costs

The Directorate for Classification Management, Office of the Assistant Secretary of Defense (Administration), has noted that the cost of procurement increases materially and unnecessarily, when material or hardware of an unclassified, off-the-shelf variety is procured as a classified item.

A particular item of off-the-shelf unclassified hardware may be an essential part of a classified system or equipment. Tubes and crystals which control frequencies are notable examples. In other cases, off-the-shelf unclassified material, when associated with a particular organization or activity, may reveal a research or development interest which itself is classified. In such cases, it is not the bare hardware or material itself which reveals classified information; rather, it is the association between the unclassified hardware or material and the classified system or effort that leads to the disclosure of classified information. Accordingly, the fact of the association requires classification.

The following suggestions are offered to contractors in connection with their procurement of off-the-shelf items of hardware of material, particularly in subcontracting or straight purchase situations:

• Concentrate on identifying the classified information which the customer wants to protect. Do not assume that hardware or material must be classified just because it will become or is a part of a properly classified end item. Determine what, if any, sensitive information can be obtained from the hardware or material alone.

• Distinguish between classified information which necessarily is contained in the procurement paperwork and the hardware or material which, by itself, may not reveal any classified information.

• Avoid all unnecessary mention of the association, whenever the association of an item of hardware or material with other material constitutes an item of information which requires classification. Often a particular item of hardware or material can be procured without any hint as to its intended use.

• Do not use classified information unless its use is necessary for understanding. Strictly limit the number of classified documents as well as the amount of classified information contained in such documents. Do not put classified information into a contract or purchase order unless it cannot be avoided. Instead, put it in a classified appendix or some other form so that the receiving party also can limit the availability.

• Do not give all personnel working on a project all of the classified information involved in the project. Provide each party only what is needed to get the job done.

Navy Begins Test of Computing System

The U.S. Navy has initiated its first full-scale test of a large remote computing time-sharing effort at the Naval Ordnance Test Station (NOTS), China Lake, Calif., utilizing the UNIVAC 1108-II System. This large-scale information processing system, primarily installed to support the varied and complex research and development work at NOTS, is also used to provide primary computational support to an experiment, linking the RADLAB (Radiological Defense Laboratory, San Francisco, Calif.) to the NOTS installation on a customer-user basis.

Communications circuits between the two laboratories, located 425 miles apart, will be activated to provide millisecond response between the central computer installation at NOTS and the scientists in San Francisco. It is anticipated that by September 1967 both the batch processing and simultaneous conversational type capability will be fully operational.

The current goal of the Naval Material Command is to achieve, during the 1970-71 time frame, considerable additional capacity through the establishment of similar remote computing/time-sharing centers within pertinent geographical areas of the command.

New Requirements for Classified Storage To Become Effective in March 1968

New requirements for defense contractors in the storage of classified material are slated to go into effect on March 1, 1968. After that date cognizant security offices of Defense Contract Administration Services of the Defense Supply Agency will be unable to certify the safeguarding ability of any defense contractor unless the new requirements have been met by the company.

The changes provide for more stringent measures in protecting Top Secret and Secret material as specified in paragraph 14a of the March 1, 1965, edition of the Industrial Security Manual. There are no substantial changes for Confidential material.

The principal change concerns the methods for storing Top Secret and Secret material. After March 1, 1968, all Top Secret material must be stored either in containers listed in the Federal Supply Schedule or in Class A vaults. In addition, supplemental controls, such as guards or alarm systems, will be required during non-working hours for protection of top secret material. Secret material may be stored in either a Federal Supply Schedule container or in a Class B vault without supplemental controls. Secret material may be stored in other than Federal Supply Schedule containers provided supplemental controls are used.

Spacetrack Unit To Move Next Year

The 73rd Aerospace Surveillance Wing, which operates Air Defense Command's world-wide spacetrack system, will move its headquarters from Ent AFB, Colo., to Tyndall AFB, Fla., in July 1968.

Relocation of the 73rd will permit utilization of vacated facilities at Tyndall and improve control of the prime operational squadron located in Florida.

The 73rd, which was upgraded from squadron to wing level in January, is concerned primarily with satellite detection and tracking. It is directly responsible for the operation of all Air Force spacetrack system sensors.

STATUS OF FUNDS

DEPARTMENT OF DEFENSE

Military Functions and Military Assistance Program

Quarterly Report

Prepared by:
Directorate for Financial Analysis and Control
Office of the Assistant Secretary of Defense (Comptroller)
Room 3C 839, The Pentagon Phone: (202) OXford 7-2332

NOTE: All expenditure amounts are on a net Treasury basis (gross payments less reimbursement collections), whereas obligations and unpaid obligations are on a gross basis (inclusive of reimbursable activity performed by components of DOD for each other). Therefore, unpaid obligations as of the end of the reporting month cannot be computed from other figures in this report.

Expenditures

Third Quarter, Fiscal Year 1967

(Amounts in Thousands)

Department of Defense

	Expenditures				Unpaid Obligations	
	Jan. 1967	Feb. 1967	March 1967	Cum. thru March 31, 1967	At Start of Year	As of March 31, 1967
Military Personnel:						
Active forces	1,440,365	1,391,586	1,502,472	12,414,430	589,609	1,035,706
Reserve forces	56,866	58,389	70,914	650,704	156,797	132,055
Retired pay	156,090	157,060	157,943	1,350,529	8,052	8,333
Undistributed	28,473	56,454	9,922	14,432	—	−14,432
Total—Military Personnel	1,681,793	1,663,489	1,741,251	14,430,095	754,459	1,161,662
Operation and Maintenance	1,584,749	1,555,566	1,774,500	13,625,638	3,022,637	3,482,656
Procurement:						
Aircraft	792,680	715,380	885,043	6,260,808	7,508,668	7,888,630
Missiles	155,944	155,583	145,054	1,412,403	2,083,027	1,850,437
Ships	94,505	109,251	116,648	969,340	2,867,571	3,170,185
Tracked combat vehicles	29,053	21,250	23,791	157,142	449,010	558,265
Ordnance, vehicles, and related equipment	350,280	356,185	425,487	2,649,150	6,110,216	6,530,299
Electronics and communications	88,517	100,775	124,103	897,188	1,855,134	1,721,710
Other procurement	114,590	110,842	132,567	1,069,753	1,582,709	1,695,930
Undistributed	54,673	−78,102	50,006	314,438	−337,631	−653,783
Total—Procurement	1,680,246	1,491,159	1,902,704	13,730,224	22,118,704	22,770,087
Research, Development, Test, and Evaluation:						
Military sciences	78,203	74,242	92,579	749,435	891,487	809,543
Aircraft	92,724	60,357	121,378	813,612	530,278	642,235
Missiles	159,965	201,031	246,808	1,738,227	1,097,218	1,415,247
Astronautics	12,579	59,906	123,196	708,657	590,546	460,870
Ships	27,824	19,940	26,799	237,348	204,702	191,508
Ordnance, vehicles, and related equipment	28,958	28,119	34,818	256,000	237,072	255,714
Other equipment	60,069	52,970	60,364	474,734	480,164	487,168
Program-wide management and support	39,145	33,756	32,653	327,018	154,656	135,596
Undistributed	17,848	−23,434	−17,889	107,238	−145,833	−254,103
Total—Research, Development, Test, & Eval.	517,314	506,886	720,708	5,413,170	4,058,380	4,143,782
Military Construction	111,665	136,598	138,393	1,259,712	1,309,722	1,089,754
Family Housing	44,810	48,008	51,195	419,622	130,266	103,226
Civil Defense	7,345	8,022	10,748	74,684	77,877	82,530
Other—Special Foreign Currency Program	—	—	—	—	—	—
Revolving and Management Funds [a]	283,603	99,335	271,866	1,059,584	658,208	−308,704
Subtotal—Military Functions	5,911,525	5,509,061	6,611,367	50,012,729	32,130,313	32,444,543
Military Assistance	50,683	69,966	83,836	510,238	1,816,161	2,207,078
TOTAL—DEPARTMENT OF DEFENSE	5,962,208	5,579,027	6,695,203	50,522,967	33,946,474	34,651,622

[a] Includes In-Transit Stock Fund charges not reflected in Service amounts below.
NOTE: Detail may not add to rounded totals.

Department of the Navy

	Expenditures				Unpaid Obligations	
	Jan. 1967	Feb. 1967	March 1967	Cum. thru March 31, 1967	At Start of Year	As of March 31, 1967
Military Personnel:						
Active forces	429,294	415,563	444,793	3,696,029	141,289	292,808
Reserve forces	9,977	10,902	13,898	110,427	20,898	19,615
Undistributed	−4,265	−7,394	18,235	9,960	—	−9,960
Total—Military Personnel	435,006	419,071	476,926	3,816,416	162,187	302,463
Operation and Maintenance	438,905	406,650	458,549	3,738,395	1,230,060	1,075,064
Procurement:						
Aircraft	222,198	186,076	259,543	1,943,354	2,818,833	2,684,009
Missiles	20,692	22,202	49,379	318,038	560,035	454,334
Ships	94,505	109,251	116,648	969,340	2,867,571	3,179,185
Tracked combat vehicles	4,356	−704	1,350	6,013	16,445	23,604
Ordnance, vehicles, and related equipment	78,442	57,614	99,272	652,632	1,418,223	1,505,237
Electronics and communications	31,948	28,342	49,052	293,455	589,237	522,316
Other procurement	43,627	45,573	33,587	366,546	726,357	803,622
Undistributed	2,319	−21,238	14,253	17,429	—	−17,424
Total—Procurement	498,090	427,115	623,084	4,566,807	8,996,701	9,154,885
Research, Development, Test, and Evaluation:						
Military sciences	10,892	12,824	13,666	148,660	137,459	116,350
Aircraft	21,995	17,850	31,664	180,702	159,020	131,946
Missiles	46,529	47,803	85,008	515,283	249,864	387,292
Astronautics	1,640	1,320	1,505	16,836	15,876	10,822
Ships	27,824	19,940	26,799	237,348	204,792	191,508
Ordnance, vehicles, and related equipment	9,871	7,980	19,018	122,104	97,150	100,893
Other equipment	5,750	6,212	9,714	58,918	61,511	65,819
Program-wide management and support	12,546	6,737	2,423	71,141	88,594	77,795
Undistributed	501	−1,678	−3,351	−230	—	230
Total—Research, Development, Test, & Eval.	137,548	118,988	186,447	1,350,823	1,014,266	1,082,655
Military Construction	52,134	55,640	63,630	697,202	323,771	−30,145
Revolving and Management Funds	40,464	91,997	87,909	91,663	617,445	480,437
TOTAL—DEPARTMENT OF THE NAVY	1,602,146	1,519,461	1,896,544	14,261,305	12,344,431	12,065,361

Department of the Army

	Expenditures				Unpaid Obligations	
	Jan. 1967	Feb. 1967	March 1967	Cum. thru March 31, 1967	At Start of Year	As of March 31, 1967
Military Personnel:						
Active forces	564,516	540,736	610,021	4,760,254	320,524	496,645
Reserve forces	30,583	39,681	46,060	429,395	114,434	93,585
Undistributed	33,526	61,959	−8,642	3,372	—	−3,372
Total—Military Personnel	628,625	642,376	647,439	5,193,021	434,958	586,858
Operation and Maintenance	566,200	555,142	660,134	4,975,145	881,122	1,239,386
Procurement:						
Aircraft	73,613	70,946	97,704	677,151	1,137,653	1,093,203
Missiles	33,930	35,379	−21,043	173,999	537,097	453,222
Tracked combat vehicles	24,697	21,954	22,441	151,129	432,565	534,661
Ordnance, vehicles, and related equipment	221,276	239,381	264,861	1,482,863	3,421,137	3,092,183
Electronics and communications	28,890	40,378	44,154	299,246	738,404	666,731
Other procurement	48,498	46,067	53,066	400,065	666,038	697,801
Undistributed	47,959	−54,251	36,134	297,222	−337,631	−636,552
Total—Procurement	478,864	399,853	497,320	3,481,677	6,595,203	5,901,247
Research, Development, Test, and Evaluation:						
Military sciences	11,562	12,720	15,151	114,775	120,589	137,917
Aircraft	11,653	7,642	15,237	91,757	92,925	85,158
Missiles	54,741	67,616	80,952	544,926	461,337	554,284
Astronautics	1,479	1,282	1,882	16,833	20,741	12,870
Ordnance, vehicles, and related equipment	19,087	20,139	15,800	134,796	139,922	154,821
Other equipment	24,020	21,680	27,159	186,128	197,438	191,655
Program-wide management and support	5,617	9,470	5,469	62,484	31,310	32,088
Undistributed	4,142	−18,368	−11,278	106,653	−145,833	−253,518
Total-Research, Development, Test, & Eval.	132,302	122,181	150,372	1,258,352	918,429	915,881
Military Construction	24,273	38,151	36,517	225,053	518,995	703,840
Revolving and Management Funds	57,650	−10,219	48,116	−191,130	40,077	−70,322
TOTAL—DEPARTMENT OF THE ARMY	1,887,914	1,747,483	2,039,898	14,942,117	9,388,844	9,270,880

Department of the Air Force

	Expenditures				Unpaid Obligations	
	Jan. 1967	Feb. 1967	March 1967	Cum. thru March 31, 1967	At Start of Year	As of March 31, 1967
Military Personnel:						
Active forces	446,555	435,287	447,658	3,958,147	127,796	246,253
Reserve forces	16,306	7,806	10,956	110,882	21,465	18,855
Undistributed	−788	1,889	329	1,100	—	−1,100
Total—Military Personnel	462,073	444,982	458,943	4,070,129	149,261	264,008
Operation and Maintenance	494,748	524,281	564,121	4,216,579	805,314	1,070,266
Procurement:						
Aircraft	496,869	458,358	527,796	3,640,303	3,552,182	4,111,424
Missiles	101,322	98,002	116,718	920,366	985,895	942,881
Ordnance, vehicles & related equipment	50,306	59,103	61,263	512,129	1,269,060	1,939,648
Electronics and communications	25,830	31,682	29,954	296,513	519,055	527,084
Other procurement	19,481	16,746	43,381	282,910	153,725	154,918
Undistributed	4,482	−2,579	−358	−231	—	211
Total—Procurement	698,290	661,311	778,755	5,651,990	6,479,917	7,676,166
Research, Development, Test, and Evaluation:						
Military sciences	13,851	11,876	14,846	113,781	131,634	131,119
Aircraft	59,076	34,865	74,477	541,093	287,333	425,131
Missiles	58,695	85,612	80,848	678,018	386,017	473,671
Astronautics	9,460	57,304	119,809	674,988	562,929	437,178
Other equipment	30,299	25,078	23,491	229,688	221,215	229,694
Program-wide management and support	20,982	17,549	24,761	193,393	34,752	25,113
Undistributed	13,205	−3,388	−3,260	815	—	−815
Total—Research, Development, Test, & Eval.	205,567	228,896	334,972	2,431,776	1,623,880	1,721,089
Military Construction	34,516	41,136	36,973	326,296	442,931	399,593
Revolving and Management Funds	74,279	−1,993	18,498	2,382	686	−6,873
TOTAL—DEPARTMENT OF THE AIR FORCE	1,969,472	1,898,613	2,192,263	16,699,152	9,501,989	11,124,250

Defense Agencies/Office of the Secretary of Defense

	Expenditures				Unpaid Obligatio[ns]	
	Jan. 1967	Feb. 1967	March 1967	Cum. thru March 31, 1967	At Start of Year	As [of] March 196[7]
Military Personnel:						
Retired Pay	156,090	157,060	157,943	1,350,529	8,052	
Operation and Maintenance	84,895	69,493	91,697	695,520	106,140	[illegible]
Procurement:						
Ordnance, vehicles, and related equipment	256	87	91	1,526	1,706	
Electronics and communications	1,849	373	943	7,974	8,438	
Other procurement	2,984	2,456	2,533	20,232	36,649	[illegible]
Undistributed	−87	−34	−23	18	—	
Total—Procurement	5,002	2,881	3,545	29,750	46,883	[illegible]
Research, Development, Test, and Evaluation:						
Military sciences	41,898	36,822	48,916	372,219	501,805	4[illegible]
Military Construction	741	1,671	1,273	11,161	24,025	[illegible]
Family Housing	44,810	48,008	51,195	419,622	130,266	1[illegible]
Other—Special Foreign Currency Program	—	—	—	—	—	
Revolving and Management Funds	97,933	−92,850	118,026	369,500	—	—
TOTAL—DEFENSE AGENCIES/OSD	431,370	223,084	472,595	3,248,301	817,172	6[illegible]

Office of Civil Defense

	Jan. 1967	Feb. 1967	March 1967	Cum. thru March 31, 1967	At Start of Year	As [of] March 196[7]
Civil Defense	7,345	8,022	10,748	74,084	77,877	
Revolving and Management Funds	—	—	—	−1	—	
TOTAL—OFFICE OF CIVIL DEFENSE	7,345	8,022	10,748	74,683	77,877	

Military Assistance

	Jan. 1967	Feb. 1967	March 1967	Cum. thru March 31, 1967	At Start of Year	As [of] March 196[7]
Military Personnel	2	—	242	240	72	
Operation and Maintenance	21,259	33,371	9,936	200,754	304,523	3[illegible]
Procurement:						
Aircraft	8,480	10,893	12,456	126,948	339,420	3[illegible]
Missiles	1,593	5,934	2,356	21,486	67,918	
Ships	1,641	280	9,620	14,604	114,172	1[illegible]
Ordnance, vehicles, and related equipment	5,904	10,643	10,338	66,002	248,807	3[illegible]
Electronics and communications	4,653	1,633	4,993	34,068	181,174	1[illegible]
Other procurement	2,221	7,936	5,294	33,019	138,193	1[illegible]
Total—Procurement	24,489	37,320	45,057	296,128	1,089,753	1,0[illegible]
Research, Development, Test, and Evaluation	15	—	63	175	3,084	
Military Construction	4,995	4,416	13,378	36,951	151,977	1[illegible]
Revolving Fund	−7,737	7,859	4,970	6,343	158,605	6[illegible]
Undistributed	7,658	−13,002	10,192	−30,362	48,148	[illegible]
TOTAL—MILITARY ASSISTANCE	50,683	69,966	83,836	510,238	[a] 1,810,161	2,2[illegible]

[a] Consistent with the decision to treat reservations under limitation .002 as obligations in reports commencing with F[Y] the unpaid obligations at start of year are comprised of obligations/reservations and, thus, differ from the unpaid obligatio[ns] June 30 1966, as shown in the [illegible]

Obligations

Third Quarter, Fiscal Year 1967

(Amounts in Thousands)

Department of Defense

	Available for Obligation	Obligations Jan. 1967	Obligations Feb. 1967	Obligations March 1967	Obligations Cum. thru March 31, 1967	Unobligated Balance March 31, 1967
Military Personnel						
Active forces	16,207,056	1,472,919	1,464,391	1,485,343	13,071,471	3,135,584
Reserve forces	937,814	59,235	64,163	72,107	640,359	297,455
Retired pay	1,780,000	156,343	156,981	157,244	1,350,881	429,119
Total—Military Personnel	18,924,870	1,688,497	1,685,536	1,714,694	15,062,712	3,862,158
Operation and Maintenance	18,157,178	1,806,923	1,540,484	1,792,865	15,294,709	2,862,469
Procurement:						
Aircraft	11,622,681	711,836	625,767	928,954	7,005,747	4,616,934
Missiles	2,530,877	168,212	226,220	140,466	1,383,871	1,147,006
Ships	5,170,986	177,992	55,256	96,177	1,362,464	3,808,522
Tracked combat vehicles	525,573	27,239	33,011	28,713	304,543	221,030
Ordnance, vehicles and related equipment	6,434,461	391,972	274,540	415,775	3,589,262	2,845,199
Electronics and communications	2,053,768	128,147	94,060	134,499	852,386	1,201,382
Other procurement	2,344,607	132,809	142,209	179,542	1,258,681	1,085,926
Undistributed	−653,695	—	—	—	—	−653,696
Total—Procurement	30,029,258	1,738,206	1,451,064	1,924,126	15,756,951	14,272,307
Research, Development, Test, & Evaluation:						
Military sciences	1,223,887	102,954	56,012	89,022	715,979	507,908
Aircraft	1,488,877	55,059	95,063	105,352	931,351	557,526
Missiles	2,509,272	153,689	131,162	284,173	2,110,792	398,480
Astronautics	1,426,489	72,251	56,092	121,464	763,548	662,941
Ships	390,220	26,137	15,319	20,640	240,027	150,193
Ordnance, vehicles, and related equipment	420,798	13,219	26,664	19,347	297,797	123,001
Other equipment	872,061	52,728	37,881	43,864	511,452	360,609
Program-wide management and support	712,379	48,046	39,715	38,356	445,567	266,812
Emergency Fund	5,853	—	—	—	—	5,853
Undistributed	45,297	—	—	—	—	45,297
Total—Research, Development, Test, & Eval.	9,095,130	524,079	457,915	722,215	6,016,513	3,078,616
Military Construction	2,768,501	179,088	88,401	142,120	1,146,952	1,621,549
Family Housing	729,131	46,931	42,583	42,774	397,984	331,146
Civil Defense	141,550	6,697	10,446	10,210	81,609	59,941
Other—Special Foreign Currency Program	7,348	—	—	—	—	7,348
Subtotal—Military Functions	79,852,965	5,990,422	5,276,428	6,349,006	53,757,431	26,095,535
Military Assistance	742,866	65,740	174,243	5,178	558,151	184,716
TOTAL—DEPARTMENT OF DEFENSE	80,595,832	6,056,162	5,450,671	6,354,183	54,315,581	26,280,250

Department of the Army

	Available for Obligation	Obligations				Unobligated Balance March 31 1967
		Jan. 1967	Feb. 1967	March 1967	Cum. thru March 31, 1967	
Military Personnel						
Active forces	6,286,664	587,217	600,320	580,619	5,063,474	1,223,1
Reserve forces	636,644	37,524	41,939	47,340	420,555	216,0
Total—Military Personnel	6,923,308	624,741	642,259	627,960	5,484,030	1,439,2
Operation and Maintenance	6,296,514	686,161	554,109	802,589	5,781,629	514,8
Procurement:						
Aircraft	1,022,726	37,159	40,456	81,785	643,983	378,7
Missiles	443,134	17,394	65,265	26,725	211,100	232,0
Tracked combat vehicles	503,583	25,569	32,244	22,035	291,371	212,2
Ordnance, vehicles and related equipment	2,004,883	154,883	187,452	196,035	1,655,398	349,4
Electronics and communications	660,239	37,044	20,003	40,401	258,151	402,0
Other procurement	863,902	59,864	58,648	97,201	456,588	407,3
Undistributed	181,149	—	—	—	—	181,1
Total—Procurement	6,679,616	331,913	404,070	464,181	3,516,590	3,163,0
Research, Development, Test, & Evaluation:						
Military sciences	221,322	14,560	8,668	11,845	148,815	72,5
Aircraft	140,267	2,674	7,975	19,076	86,842	53,4
Missiles	774,745	23,464	14,045	136,035	648,029	126,7
Astronautics	21,678	435	1,684	229	9,288	12,3
Ordnance, vehicles and related equipment	233,991	5,260	20,441	6,311	171,936	62,0
Other equipment	377,062	21,649	17,745	25,343	194,111	182,9
Program-wide management and support	97,688	6,921	6,605	4,705	75,878	21,81
Undistributed	9,918	—	—	—	—	9,91
Total—Research, Development, Test, & Eval.	1,876,671	74,960	77,166	203,544	1,334,899	541,77
Military Construction	1,327,998	84,787	34,704	47,796	568,077	759,92
TOTAL—DEPARTMENT OF THE ARMY	23,104,108	1,802,562	1,712,307	2,146,070	16,685,225	6,418,88

Department of the Navy

	Available for Obligation	Obligations				Unobligated Balance March 31, 1967
		Jan. 1967	Feb. 1967	March 1967	Cum. thru March 31, 1967	
Military Personnel:						
Active forces	4,876,592	433,410	412,823	435,982	3,874,853	1,001,739
Reserve forces	149,320	11,070	11,690	12,219	108,928	40,392
Total—Military Personnel	5,025,912	444,480	424,513	448,201	3,983,781	1,042,131
Operation and Maintenance	5,312,710	465,857	420,555	384,677	3,950,650	1,362,060
Procurement:						
Aircraft	3,664,594	214,938	286,064	191,590	1,837,896	1,826,698
Missiles	526,764	38,928	19,653	26,896	225,605	301,159
Ships	5,170,986	177,992	55,256	96,177	1,362,464	3,808,522
Tracked combat vehicles	21,990	1,669	768	6,678	13,172	8,818
Ordnance, vehicles and related equipment	1,685,726	115,924	95,537	39,015	749,162	936,564
Electronics and communications	691,299	33,818	27,315	33,599	232,662	458,637
Other procurement	1,043,656	58,482	60,103	46,924	490,184	553,472
Undistributed	−810,852	—	—	—	—	−810,853
Total—Procurement	11,994,163	641,752	544,694	440,880	4,911,143	7,083,017
Research, Development, Test, and Evaluation:						
Military sciences	210,460	10,632	10,773	19,101	139,396	71,064
Aircraft	445,288	20,014	21,507	16,770	153,744	291,544
Missiles	769,066	35,652	78,173	63,614	657,300	111,766
Astronautics	25,367	555	269	1,603	11,706	13,661
Ships	390,220	26,137	15,319	20,640	240,027	150,193
Ordnances, vehicles and related equipment	186,807	7,959	6,223	13,036	125,861	60,946
Other equipment	117,288	16,314	3,824	5,665	66,705	50,583
Program-wide management and support	353,243	21,936	16,120	13,866	173,287	179,956
Undistributed	4,524	—	—	—	—	4,524
Total—Research, Development, Test, & Eval.	2,502,263	139,799	152,217	154,295	1,568,026	934,237
Military Construction	755,409	41,926	30,385	38,486	291,755	463,654
TOTAL—DEPARTMENT OF THE NAVY	25,590,457	1,733,812	1,572,366	1,466,538	14,705,355	10,885,102

Department of the Air Force

	Available for Obligation	Obligations				Unobligated Balance March 31, 1967
		Jan. 1967	Feb. 1967	March 1967	Cum. thru March 31, 1967	
Military Personnel:						
Active forces	5,043,800	452,292	451,248	468,742	4,133,144	910,676
Reserve forces	151,850	10,641	10,534	12,548	110,870	40,934
Total—Military Personnel	5,195,650	462,933	461,782	481,290	4,244,020	951,680
Operation and Maintenance	5,645,478	564,848	494,456	520,237	4,824,170	821,308
Procurement:						
Aircraft	6,935,361	459,739	299,247	655,579	4,523,868	2,411,493
Missiles	1,560,979	111,890	141,302	86,845	947,166	613,813
Ships	—	—	—	—	—	—
Ordnance, vehicles and related equipment	1,740,495	121,081	−8,630	179,874	1,182,717	557,778
Electronics and communications	684,568	56,719	46,333	59,224	356,458	328,110
Other Procurement	370,957	12,276	20,705	32,571	284,103	86,854
Undistributed	−32,307	—	—	—	—	−32,307
Total—Procurement	11,260,053	761,704	498,957	1,014,093	7,294,312	3,965,741
Research, Development, Test, & Evaluation:						
Military sciences	208,637	25,094	12,885	16,370	132,580	76,057
Aircraft	903,322	31,771	65,581	69,506	690,765	212,557
Missiles	965,461	94,573	38,944	84,524	805,463	159,998
Astronautics	1,379,444	71,261	54,139	119,632	742,554	636,890
Other equipment	377,711	14,765	16,312	12,856	250,636	127,075
Program-wide management and support	261,448	19,189	16,981	19,785	196,402	65,046
Undistributed	30,855	—	—	—	—	30,855
Total—Research, Development, Test, & Eval.	4,126,875	256,654	204,845	322,670	2,818,400	1,308,475
Military Construction	665,650	52,274	23,149	55,002	283,515	382,136
TOTAL—DEPARTMENT OF THE AIR FORCE	26,893,706	2,098,413	1,683,190	2,393,290	19,464,416	7,420,290

Defense Agencies/Office of the Secretary of Defense

	Available for Obligation	Obligations Jan. 1967	Obligations Feb. 1967	Obligations March 1967	Obligations Cum. thru March 31, 1967	Unobligated Balance March 31, 1967
Military Personnel:						
Retired Pay	1,780,000	156,343	156,981	157,244	1,350,881	429,119
Operation and Maintenance	902,476	90,057	71,364	85,363	738,260	164,216
Procurement:						
Ordnance, vehicles and related equipment	3,357	84	181	851	1,985	1,372
Electronics and communications	17,662	566	409	1,275	5,115	12,547
Other procurement	66,092	2,187	2,753	2,846	27,806	38,286
Undistributed	8,315	—	—	—	—	8,315
Total—Procurement	95,426	2,837	3,343	4,972	34,906	60,520
Research, Development, Test, and Evaluation:						
Military sciences	583,468	52,668	23,686	41,706	295,188	288,290
Emergency Fund	5,853	—	—	—	—	5,853
Undistributed	—	—	—	—	—	—
Total—Research, Development, Test, & Eval.	589,321	52,668	23,686	41,706	295,188	294,133
Military Construction	19,443	102	162	838	3,606	15,838
Family Housing	729,131	46,931	42,583	42,774	397,984	331,146
Other—Special Foreign Currency Program	7,348	—	—	—	—	7,348
TOTAL—DEFENSE AGENCIES/OSD	4,123,145	348,937	298,121	332,896	2,820,825	1,302,320

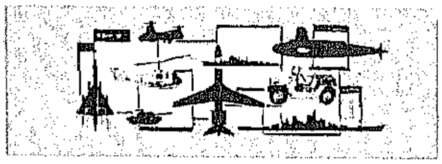
Office of Civil Defense

Civil Defense	141,550	6,697	10,446	10,210	81,609	59,941

Military Assistance

Military Personnel	335	—	88	250	335	—
Operation and Maintenance	355,166	37,348	12,098	5,926	213,768	141,398
Procurement:						
Aircraft	89,375	15,321	30,037	1,533	89,210	165
Missiles	1,902	−1,050	844	−360	1,706	196
Ships	48,009	−654	21,251	−579	35,238	12,771
Ordnance, vehicles and related equipment	124,007	−7,134	72,562	24	123,985	22
Electronics and communications	6,410	−21,083	11,313	3,458	6,400	10
Other procurement	28,847	19,007	−6,216	−6,526	27,459	1,388
Total—Procurement	298,549	4,405	129,791	−2,451	283,997	14,552
Research, Development, Test, and Evaluation	−950	−2	—	−395	−1,321	371
Military Construction	89,847	28,924	29,062	1,501	61,400	28,447
Undistributed	−81	−4,935	3,202	339	−29	−52
TOTAL—MILITARY ASSISTANCE	742,866	65,740	174,243	5,178	558,151	184,716

NOTE: Commencing with reports in FY 1967, reservations under limitation .002 of the Military Assistance Program are being treated as obligations.



DEFENSE PROCUREMENT

Contracts of $1,000,000 and over awarded during the month of May 1967.

DEFENSE SUPPLY AGENCY

1—**Bibb Mfg. Co.**, Macon, Ga. $1,317,200. 356,000 linear yards of herring bone twill cloth. Defense Personnel Support Center, Philadelphia, Pa.

3—**Star Kist Food**, Terminal Island, Calif. $1,242,773. 2,697,733 pounds of canned tuna. Defense Personnel Support Center, Philadelphia, Pa.

5—The Defense Fuel Supply Center, Alexandria, Va., has awarded the following contracts for JP-5 jet fuel:
Humble Oil & Refining Co., Houston, Tex. $7,341,600. 77,280,000 gallons.
Mobil Oil Corp., New York, N.Y. $5,335,928. 53,505,200 gallons.
Sun Oil Co., Philadelphia, Pa. $5,009,715. 47,880,000 gallons.
Gulf Oil Corp., New York, N.Y. $4,092,900. 42,000,000 gallons.
Hess Oil & Chemical Corp., Perth Amboy, N.J. $3,069,978. 30,000,000 gallons.
Union Oil Co. of Calif., Los Angeles, Calif. $2,131,189. 17,388,000 gallons.
Edgington Oil Refineries, Long Beach, Calif. $1,467,600. 11,500,000 gallons.
Douglas Oil Co. of Calif., Los Angeles, Calif. $1,313,900. 11,000,000 gallons.

12—**American Tent & Canvas, Inc.**, LaFollette, Tenn. $4,200,000. 6,000 large general purpose tents. Defense Personnel Support Center, Philadelphia, Pa.

—**Camel Mfg. Co.**, Knoxville, Tenn. $3,457,934. 4,854 large general purpose tents. Defense Personnel Support Center, Philadelphia, Pa.

15—**Valley Metallurgical Processing Co.**, Essex, Conn. $1,417,300. 1,874,500 lbs. of atomized magnesium powder. Defense General Supply Center, Richmond, Va.

—**Eastman Kodak Co.**, Rochester, N.Y. $1,048,756. 20,360 rolls of aerial photographic film. Defense General Supply Center, Richmond, Va.

—**J. P. Stevens & Co.**, New York, N.Y. $6,428,090. 3,800,000 yards of polyester fiber and wool tropical cloth. Defense Personnel Support Center, Philadelphia, Pa.

—**Burlington Industries**, New York, N.Y. $2,499,154. 1,193,000 yards of polyester fiber and wool tropical cloth. Defense Personnel Support Center, Philadelphia, Pa.

16—**S. I. Handling Systems**, Easton, Pa. $1,663,207. Mechanized material handling system to be installed at the Defense Construction Supply Center, Columbus, Ohio, which is the contracting agency.

18—**Firestone Tire & Rubber Co.**, Akron, Ohio. $3,323,768. 495 runway surfacing membrane sets and 790 taxiway surfacing membrane sets. Defense Construction Supply Agency, Columbus, Ohio.

—**B. G. Colton & Co.**, New York, N.Y. $2,051,242. 1,459,241 linear yards of cotton duck cloth. Defense Personnel Support Center, Philadelphia, Pa.

19—**American Oil Co.**, Chicago, Ill. $2,112,809. Various quantities of petroleum products. Defense Fuel Supply Center, Alexandria, Va.

—**Mobil Oil Corp.**, New York, N.Y. $2,030,123. Various quantities of petroleum products. Defense Fuel Supply Center, Alexandria, Va.

—**J. P. Stevens & Co.**, New York, N.Y. $3,599,934. 4,991,608 linear yards of cotton and rayon cloth. Defense Personnel Support Center, Philadelphia, Pa.

—**Genesco, Inc.**, Florence, Ala. $1,612,781. 600,000 men's light-weight winter undershirts. Defense Personnel Support Center, Philadelphia, Pa.

—**Bates Fabrics**, New York, N.Y. $1,572,694. 1,078,000 yards of cotton and nylon oxford cloth. Defense Personnel Support Center, Philadelphia, Pa.

—**Sperry Rand Corp.**, Gainesville, Fla. $1,338,490. Electron tubes. Defense Electronics Supply Center, Dayton, Ohio.

—**Robert DeMay Co.**, Hamlet, N.C. $1,197,217. 46,100 water sterilizing bags. Defense Construction Supply Center, Columbus, Ohio.

22—**Cavalier Bag Co.**, Lumberton, N.C. $1,848,280. 9,424,000 polypropylene sand bags. Defense General Supply Center, Richmond, Va.

23—**LaCrosse Garment Mfg. Co.**, LaCrosse, Wis. $1,008,352. 67,160 arctic sleeping bags. Defense Personnel Support Center, Philadelphia, Pa.

25—The Defense Fuel Supply Center, Alexandria, Va., has awarded the following contracts for petroleum products:
Atlantic Richfield Co., Los Angeles, Calif. $5,846,000. 2,400,000 barrels of Navy Special.
Cities Service Oil Co., New York, N.Y. $5,634,480. 1,200,000 barrels of Type I Combat Gasoline.
Marathon Oil Co., New York, N.Y. $3,105,700. 780,000 barrels of Grade DF-1 Diesel.
Texaco, Inc., New York, N.Y. $2,853,750. 750,000 barrels of Diesel Marine.
Hess Oil & Chemical Corp., Perth Amboy, N.J. $2,362,255. 302,000 barrels of Combat Type I Gasoline.
Continental Oil Co., Houston, Tex. $2,160,540. 540,000 barrels of Diesel Marine.
Atlantic Richfield Co., Los Angeles, Calif. $1,799,000. 400,000 barrels of Diesel Marine.
Golden Eagle Refining Co., Los Angeles, Calif. $1,434,500. 550,000 barrels of Navy Special.
Continental Oil Co., Houston, Tex. $1,240,310. 310,000 barrels of Diesel Marine.
Standard Oil Co. of Calif., San Francisco, Calif. $1,182,000. 600,000 barrels of Number Six Fuel Oil.

—**J. P. Stevens & Co.**, New York, N.Y. $5,784,369. 5,720,000 yards of cotton and polyester poplin cloth. Defense Personnel Support Center, Philadelphia, Pa.

—**Erwin Mills**, New York, N.Y. $2,485,178. 2,451,376 yards of wind resistant sateen cotton cloth. Defense Personnel Support Center, Philadelphia, Pa.

26—The following contracts have been awarded by the Defense Fuel Supply Center, Alexandria, Va., for JP-4 jet fuel:
Humble Oil & Refining Co., Houston, Tex. $24,021,918. 246,884,000 gallons.
Mobil Oil Corp., New York, N.Y. $21,971,976. 209,171,000 gallons.
Mobil Oil Corp., Houston, Tex. $2,119,000. 20,000,000 gallons.
Standard Oil Co. of Calif., San Francisco, Calif. $18,455,478. 175,309,000 gallons.
Continental Oil Co., Houston, Tex. $11,759,880. 118,902,300 gallons.
Texaco, Inc., New York, N.Y. $10,888,500. 105,000,000 gallons.
Union Oil Co. of Calif., Los Angeles, Calif. $9,503,739. 88,099,200 gallons.
Sinclair Refining Co., New York, N.Y. $8,767,464. 85,320,000 gallons.
Gulf Oil Corp., New York, N.Y. $8,374,800. 84,000,000 gallons.
American Oil Co., Chicago, Ill. $7,960,815. 82,435,000 gallons.
Ashland Oil & Refining Co., Ashland, Ky. $7,308,808. 70,600,000 gallons.
Coastal States Petrochemical Co., Houston, Tex. $6,806,902. 63,250,000 gallons.
Golden Eagle Refining Co., Los Angeles, Calif. $5,423,040. 46,200,000 gallons.
Cities Service Oil Co., New York, N.Y. $4,890,876. 47,754,000 gallons.
Atlantic Richfield Co., Los Angeles, Calif. $4,596,900. 42,000,000 gallons.
Atlantic Richfield Co., Philadelphia, Pa. $4,410,000. 40,000,000 gallons.
Adobe Refining Co., Midland, Tex. $4,380,348. 40,000,000 gallons.
Bell Oil & Gas Co., Bartlesville, Okla. $4,281,455. 45,000,000 gallons.
Okmulgee Refining Co., Dallas, Tex. $4,146,846. 42,900,000 gallons.
Phillips Petroleum Co., Bartlesville, Okla. $4,085,154. 39,030,000 gallons.
Shamrock Oil & Gas Corp., Amarillo, Tex. $4,056,100. 38,000,000 gallons.
Sun Oil Co., Philadelphia, Pa. $3,978,828. 37,800,000 gallons.
Howell Refining Co., San Antonio, Tex. $3,973,676. 36,750,000 gallons.
Delta Refining Co., Memphis, Tenn. $3,817,693. 35,850,000 gallons.
American Petrofina Co. of Tex., Dallas, Tex. $3,763,970. 41,000,000 gallons.
Fort Worth Refining Co., Houston, Tex. $3,707,280. 36,000,000 gallons.
Tidewater Oil Co., New York, N.Y. $3,449,418. 30,912,000 gallons.
Good Hope Refineries, Houston, Tex. $3,321,600. 32,000,000 gallons.
Hess Oil & Chemical Corp., Perth Amboy, N.J. $3,049,500. 30,000,000 gallons.
Douglas Oil Co. of Calif., Los Angeles, Calif. $2,430,900. 21,000,000 gallons.
MacMillan Ring-Free Oil Co., Los Angeles, Calif. $2,208,000. 20,000,000 gallons.
Sioux Oil Co., Newcastle, Wyo. $2,170,422. 18,000,000 gallons.
Tonkawa Refining Co., Arnett, Okla. $2,038,410. 20,000,000 gallons.
Sunray DX Oil Co., Tulsa, Okla. $1,957,232. 20,917,600 gallons.
Tesoro Petroleum Corp., San Antonio, Tex. $1,919,000. 17,000,000 gallons.
Triangle Refineries, Houston, Tex. $1,886,072. 16,780,000 gallons.
Fletcher Oil & Refining Co., Wilmington, Calif. $1,625,400. 14,000,000 gallons.
Marathon Oil Co., New York, N.Y. $1,605,576. 15,960,000 gallons.
Sequoia Refining Corp., Corpus Christi, Tex. $1,498,796. 15,500,000 gallons.
Northwestern Refining Co., St. Paul Park, Minn. $1,473,606. 14,000,000 gallons.
Kerr-McGee Corp., Oklahoma City, Okla. $1,429,470. 15,120,000 gallons.
Crystal Flash Petroleum Corp., Indianapolis, Ind. $1,269,000. 11,400,000 gallons.
Hercules Oil Co. of San Diego, Long Beach, Calif. $1,237,750. 10,000,000 gallons.
Champlin Petroleum Co., Fort Worth, Tex. $1,168,800. 12,000,000 gallons.
Hunt Oil Co., Dallas, Tex. $1,162,500. 12,500,000 gallons.
Derby Refining Co., Wichita, Kan. $1,058,938. 12,000,000 gallons.

29—**Alpha Industries**, Knoxville, Tenn. $1,380,724. 195,570 men's field coats with hoods. Defense Personnel Support Center, Philadelphia, Pa.

—**Allen Overall Co.**, Monroe, N.C. $1,208,705. 200,000 men's field coats with hoods. Defense Personnel Support Center, Philadelphia, Pa.

—**Orthopedic Equipment Co.**, Bourbon, Ind. $3,650,572. 235,458 straight chairs. Defense General Supply Center, Richmond, Va.

31—**Bancroft Industries**, Cabot, Ark. $1,015,660. 1,170,116 field caps. Defense Personnel Support Center, Philadelphia, Pa.

ARMY

1—**Ward LaFrance Corp.**, Elmira Heights, N.Y. $1,322,199. 55 fire-fighting trucks. Elmira Heights. Mobility Equipment Command, St. Louis, Mo.

—**Norfolk Dredging Co.**, Norfolk, Va. $1,189,818. Dredging work in Norfolk Harbor. Engineer Dist., Norfolk, Va.

—**Boeing Co.**, Morton, Pa. $3,500,000. Preproduction planning, procurement and production of long lead time materials and items for CH-47B helicopters for the United Kingdom. Morton. Aviation Materiel Command, St. Louis, Mo.

—**AVCO Corp.**, Stratford, Conn. $2,707,313. CH-47 helicopter engines for the United Kingdom. Stratford. Aviation Materiel Command, St. Louis, Mo.

—**Kaiser-Jeep Corp.**, Toledo, Ohio. $1,395,141. 2½-ton trucks with government furnished engines. South Bend, Ind. General Purpose Vehicles Project Manager, Warren, Mich.

—**T. D. O'Connor & Co.**, Cambridge, Mass. $1,144,100. Modification of existing facilities and new construction to load, assem-

CONTRACT LEGEND
Contract information is listed in the following sequence: Date — Company — Value — Material or Work to be performed—Location Work Performed—Contracting Agency.

ble and pack ammunition at the Hingham Naval Depot Annex, Cohasset, Mass. Engineer Dist., Waltham, Mass.

—Civil Works Constructors, Farmington, Mich. $1,386,000. Work on the Four River Basin Project, Tampa, Fla. Engineer Dist., Jacksonville, Fla.

—Hupp Corp., Canton, Ohio. $3,261,152. Ten and 20-horsepower engines. Canton. Mobility Equipment Command, St. Louis, Mo.

—Brown & Root, Houston, Tex. $1,917,000. Construction of tactical stage field and refueling areas for expanded aviation training facilities at Fort Wolters, Tex. Engineer Dist., Fort Worth, Tex.

—Barber-Green Co., Aurora, Ill. $1,946,494. Eight asphalt mixing plants. Aurora. Mobility Equipment Command, St. Louis, Mo.

—Isotopes, Inc., Westwood, N.J. $1,047,405. Continuation of classified research. Defense Atomic Support Agency, Washington, D.C.

—Continental Motors, Muskegon, Mich. $2,914,589. Three and six horsepower gasoline engines. Milwaukee, Wis. Mobility Equipment Command, St. Louis, Mo.

—Aircraft Radio Corp., Boonton, N.J. $1,198,975. Radio test sets. Boonton. Electronics Command, Philadelphia, Pa.

—Fruehauf Corp., Detroit, Mich. $12,622,815. 12-ton semi-trailers. Detroit. Tank Automotive Command, Warren, Mich.

—T. L. James & Co., Ruston, La. $1,187,537. Work on the Atchafalaya Basin Project. St. Martin and Mary Parishes, La. Engineer Dist., New Orleans, La.

—Olin Mathieson Chemical Corp., East Alton, Ill. $2,271,963. Ball powder, propellant, chemicals and operations and maintenance activities. Baraboo, Wis. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Olin Mathieson Chemical Corp., New York, N.Y. $18,278,450. Propellant charges and bag loading used for various rounds of ammunition. Charlestown, Ind. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Honeywell, Inc., Hopkins, Minn. $1,726,780. Metal parts for 40mm projectile fuzes. New Brighton, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Olin Mathieson Chemical Corp., New Haven, Conn. $3,405,132. Ammunition components. New Haven. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Olin Mathieson Chemical Corp., East Alton, Ill. $2,135,900. Ammunition components. East Alton. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Remington Arms Co., Bridgeport, Conn. $2,468,960. Ammunition components. Bridgeport. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Pettibone-Mulliken Corp., Bethesda, Md. $4,148,000. Fork lift trucks. Chicago, Ill. Mobility Equipment Command, St. Louis, Mo.

—Radalab, Westbury, N.Y. $6,310,500. Terminal telephones. Westbury. Electronics Command, Philadelphia, Pa.

—C. H. Leavell, El Paso, Tex. $14,967,998. Construction of a navigation lock, concrete dam with gated spillway, and appurtenant work at the Jonesville Lock and Dam, Ouachita-Black River Navigation Project, Arkansas and Louisiana. Engineer Dist., Vicksburg, Miss.

—Allied-Webb, Bay St. Louis, Miss. $1,435,000. Modification to existing Launch Complex 17 for the NASA Kennedy Space Center. Cape Kennedy, Fla. Engineer Dist., Merritt Island, Fla.

—D. W. L. General Contractors, Lancaster, Calif. $1,196,046. Construction of a tactical equipment shop facility; community center facility; and petroleum, oil and lubricant (POL) facilities at Fort Irwin, Calif. Engineer Dist., Los Angeles, Calif.

—Wisconsin Motor Corp., Milwaukee, Wis. $3,002,896. Military standard engines. Milwaukee. Mobility Equipment Command, St. Louis, Mo.

—I.B.M., Washington, D.C. $1,140,618. Lease of pilot equipment for the national Automatic Data Processing Program for Army Materiel Command's logistics management. Electronics Command, Fort Monmouth, N.J.

—Mason & Hanger, Silas Mason & Co., Lexington, Ky. $1,383,858. 750-lb. bombs and for operation and maintenance activities. Grand Island, Neb. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Hercules Corp., Wilmington, Del. $24,093,578. Production of miscellaneous propellants and explosives. Radford, Va. Ammunition Procurement & Supply Agency, Joliet, Ill.

—U.S. Steel, Pittsburgh, Pa. $6,308,100. Metal parts for 8-inch howitzer projectiles. $1,000,000. Reactivation, repair and relocation of government equipment. Berwick, Pa. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Kentucky Mfg. Co., Louisville, Ky. $2,490,715. 12-ton semi-trailer vans. Louisville. Tank Automotive Command, Warren, Mich.

—Taubman Co., Oak Park, Mich. $1,149,245. Erecting a prefabricated, Government furnished metal building at Joliet Army Ammunition Plant, Ill. Engineer Dist., Chicago, Ill.

—Slate-Hall, Portland, Ore. $5,702,765. Work on the Libby Dam Project, Libby, Mont. Engineer Dist., Seattle, Wash.

—Anthony Co., Streator, Ill. $2,184,000. 80 rough terrain, fork lift trucks. Streator. Mobility Equipment Command, St. Louis, Mo.

—Chrysler Corp., Detroit, Mich. $3,823,260. 140 rough terrain, fork lift trucks. Warren, Mich. Mobility Equipment Command, St. Louis, Mo.

—Norair Engineering Corp., Washington, D.C. $3,134,160. Construction of a four-story, enlisted men's barracks building and construction of an addition to an existing mess hall at Fort Myer, Va. Engineer Dist., Norfolk, Va.

9—Chamberlain Mfg. Corp., Waterloo, Iowa. $4,172,270. Metal parts for 105mm smoke projectiles. Waterloo. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Biltmore Construction Co., Clearwater, Fla. $3,226,026. Construction of a two-story headquarters command building at MacDill AFB, Fla. Engineer Dist., Jacksonville, Fla.

—Troup Bros., Coral Gables, Fla. $1,316,972. Construction of a canal for the Central and Southern Florida Flood Control Project. New River Junction, Fla. Engineer Dist., Jacksonville, Fla.

—Sylvania Electric Products, Needham Heights, Mass. $1,500,000. Classified equipment. Muncy, Pa. Electronics Command, Fort Monmouth, N.J.

U.M.C. Industries, Phoenix, Ariz. $1,728,000. Loading and assembling 81mm illuminating projectiles. Goodyear, Ariz. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Bowen-McLaughlin-York, Inc., York, Pa. $4,593,695. 175mm guns, 8-inch howitzers, and light armored recovery vehicles. Bair, Pa. Tank Automotive Command, Warren, Mich.

—Franchi Construction Co., Newton, Mass. $5,897,000. Construction of troop housing and supporting facilities at Fort Devens, Mass. New England Engineer Division, Waltham, Mass.

10—Intercontinental Mfg. Co., Garland, Tex. $3,027,970. Case and adapter Nike Hercules motors. Garland. Army Missile Command, Huntsville, Ala.

—A. D. Roe Co., Louisville, Ky. $1,647,731. Construction of an engine maintenance training building. Fort Knox, Ky. Engineer Dist., Louisville, Ky.

—Scoville Mfg. Co., Waterbury, Conn. $1,597,000. Grenade fuzes. Waterbury. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Raytheon Co., Bristol, Tenn. $1,322,190. Bomb fuzes. Bristol. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Philco-Ford Corp., Newport Beach, Calif. $1,400,757. 40mm grenade launchers and grenade launcher barrels. Anaheim, Calif. Southwest Procurement Agency, Pasadena, Calif.

11—Chrysler Corp., Detroit, Mich. $1,092,000. Production and inspection engineering services for the M60 A1 and A1E1 tank fire control system. Detroit. Frankford Arsenal, Philadelphia, Pa.

—Western Electric, Whippany, N.J. $1,986,360. Research and development effort on the Nike-X missile system. Whippany. Nike-X Project Office, Huntsville, Ala.

—Olin Mathieson Chemical Corp., East Alton, Ill. $1,012,423. Loading and assembling of 81mm illuminating projectiles. Marion, Ill. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Riddle Quarries, Inc., Salina, Kan. $1,778,000. Work on the Perry Reservoir Project, Perry, Kan. Engineer Dist., Kansas City, Kan.

—R. A. Wattson Co., North Hollywood, Calif. $1,601,000. Work on the San Gabriel River Channel Project. Between Long Beach and Seal Beach, Calif. Engineer Dist., Los Angeles, Calif.

12—General Motors, Detroit, Mich. $5,000,000. Metal parts for 105mm HE projectiles. St. Louis, Mo. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Harvey Aluminum Sales, Inc., Torrance, Calif. $9,528,562. Classified work. Milan, Tenn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Raytheon Co., Lexington, Mass. $4,436,539. Ground support equipment and field maintenance equipment for the Hawk missile system. Waltham, Mass. Army Missile Command, Andover, Mass.

—MacGregor Triangle Co., Boise, Idaho. $3,415,201. Work on the Lower Monumental Lock and Dam Project. Snake River, Wash. Engineer Dist., Seattle, Wash.

—General Motors, Indianapolis, Ind. $3,345,090. M-113 transmissions. Indianapolis. Tank Automotive Command, Warren, Mich.

—Construction, Ltd., Bordentown, N.J. $2,715,500. Building modification work at Aberdeen Proving Ground, Md. Engineer Dist., Baltimore, Md.

—Emerson Electric Co., St. Louis, Mo. $3,515,000. Helicopter armament subsystems. St. Louis. Army Weapons Command, Rock Island, Ill.

—Carter Carburetor, St. Louis, Mo. $1,828,930. Metal parts. St. Louis. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Scoville Mfg. Co., Waterbury, Conn. $1,826,272. Metal parts. Waterbury. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Norris Industries, Los Angeles, Calif. $1,321,824. 152mm projectiles. Los Angeles. Southwest Procurement Agency, Pasadena, Calif.

—LTV Aerospace Corp., Warren, Mich. $2,050,000. Research and development on the extended range Lance missile system. Warren. Army Missile Command, Huntsville, Ala.

—Honeywell, Inc., Tampa, Fla. $2,237,930. Microwave relay communications system components. Tampa. Electronics Command, Philadelphia, Pa.

—Peter Reiss Construction Co., Forest Hills, N.Y. $3,944,500. Construction and conversion of existing gymnasium at West Point. Engineer Dist., New York, N.Y.

15—Kirst Construction Co., Altadena, Calif. $5,311,004. Work on the San Gabriel River Channel-Whittier Narrows Dam Project. Downey, Pico, Rivera and Sante Fe, Calif. Engineer Dist., Los Angeles, Calif.

—Lear Siegler, Inc., Anaheim, Calif. $2,500,000. Classified electronic equipment. Anaheim. Electronics Command, Fort Monmouth, N.J.

—TEMCO, Inc., Nashville, Tenn. $2,074,500. Metal parts for 106mm projectiles. Nashville. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Atlas Chemical Industries, Wilmington, Del. $4,173,675. TNT. Chattanooga, Tenn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Pacific Car & Foundry Co., Renton, Wash. $1,500,000. Overhaul of M107 vehicles and conversion of M110 vehicles to M107 configuration. Renton. Northwest Procurement Agency, Oakland, Calif.

—A. T. Gravelle General Contractor, Indianapolis, Ind. $1,381,286. Work on the Mississinewa Reservoir Project. Peru, Ind. Engineer Dist., Louisville, Ky.

16—Hansel Phelps Construction Co., Greely, Colo. $7,112,000. Construction of a multi-story cadet quarters building at the Air Force Academy, Colorado Springs, Colo. Engineer Dist., Omaha, Neb.

—Caterpillar Tractor Co., East Peoria, Ill. $1,028,409. 23 diesel-engine tractors. East Peoria. Mobility Equipment Command, St. Louis, Mo.

17—Consolidated Diesel Electric Co., Old Greenwich, Conn. $1,251,100. 10-ton tractor trucks. Scotia, N.Y. Tank Automotive Command, Warren, Mich.

—Fabricators, Inc., Salem, Ore. $1,659,170. 1,385 floodlight sets. Salem. Mobility Equipment Command, St. Louis, Mo.

—Union Carbide Corp., New York, N.Y. $1,462,504. Dry batteries. Greenville and Charlotte, N.C. Electronics Command, Philadelphia, Pa.

—Cutler-Hammer, Inc., Deer Park, N.Y. $2,977,779. Radar sets, battery chargers and test facility kits for the light weight miniaturized combat surveillance radar set. Deer Park. Electronic Command, Philadelphia, Pa.

—Holl-Steffen Construction Co., Affton, Mo.

$1,312,196. Construction of two buildings for airmen dormitories. Scott AFB, Ill. Engineer Dist., Chicago, Ill.

—Harbert Construction Corp., Birmingham, Ala. $9,698,607. Work on Lock and Dam No. 18 on the Arkansas River. Near Inola, Okla. Engineer Dist., Tulsa, Okla.

18—E. I. Dupont De Nemours & Co., Wilmington, Del. $3,157,006. Design and development of an ammunition facility at Parsons, Kan. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Raytheon Co., Lexington, Mass. $1,723,044. Repair parts for Hawk missiles. Andover, Mass. Aviation Materiel Command, St. Louis, Mo.

—General Precision, Wayne, N.J. $1,651,425. Design and development of a prototype liquid propellant rocket motor with direction central for 105mm howitzer. Wayne. Picatinny Arsenal, Dover, N.J.

—Barnes Mfg. Co., Mansfield, Ohio. $1,014,117. Gasoline pump assemblies. Mansfield. Mobility Equipment Command, St. Louis, Mo.

—Nolan Bros., Inc., Minneapolis, Minn. $5,173,940. Work on the Cochita Dam Project, Sandoval County, N.M. Engineer Dist., Albuquerque, N.M.

—General Dynamics, Rochester, N.Y. $2,387,00. 12 radio sets and 270 receiver-transmitters. Rochester. Electronics Command, Philadelphia, Pa.

19—Bell Aerospace Corp., Fort Worth, Tex. $1,253,322. Work on the armament subsystems on AH-1G helicopters. Fort Worth. Aviation Materiel Command, St. Louis, Mo.

—I.B.M., Gathersburg, Md. $5,036,261. Five automatic data processing subsystems. Gathersburg. Electronics Command, Fort Monmouth, N.J.

—R.C.A., Camden, N.J. $5,000,000. Classified electronic equipment. Camden. Electronic Command, Fort Monmouth, N.J.

—R.C.A., Camden, N.J. $2,265,000. Tactical satellite communication ground and airborne terminals. Camden. Electronics Command, Fort Monmouth, N.J.

—Electro-Optical Systems, Pasadena, Calif. $1,554,000. Work on a night vision program. Pasadena. Electronics Command, Fort Monmouth, N.J.

—General Dynamics, Rochester, N.Y. $11,347,480. Communications equipment. Rochester, N.Y. and Orlando, Fla. Electronics Command, Philadelphia, Pa.

—Harvey Aluminum, Torrance, Calif. $1,238,733. Metal parts for 40mm projectiles. Torrance. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Bulova Watch Co., Providence, R.I. $3,412,866. Fuzes for ammunition. Providence. Procurement & Supply Agency, Joliet, Ill.

—Albion Malleable Iron Co., Albion, Mich. $1,246,800. Metal parts for 2.75-inch rockets. Albion. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Bucryus Erie Co., Evansville, Ind. $4,876,349. 12½-ton crane shovels. Erie, Pa. Mobility Equipment Command, St. Louis, Mo.

—Harnischfeger Corp., Milwaukee, Wis. $6,787,338. Truck-mounted cranes and shovels. Escanaba, Mich. Mobility Equipment Command, St. Louis, Mo.

—Gregg, Gibson & Gregg Contractors, Leesburg, Fla. $5,071,692. Work on the Central and Southern Florida Flood Control Project. Highlands, Polk and Okeechobee Counties, Fla. Engineer Dist., Jacksonville, Fla.

—Midvale-Heppenstall Co., Philadelphia, Pa. $3,452,200. Tube forging for 175mm guns. Philadelphia, Watervliet Arsenal, Watervliet, N.Y.

—Raytheon Co., Bedford, Mass. $2,100,000. Initiation of advanced development of the SAM-D missile program. Bedford. Army Missile Command, Huntsville, Ala.

22—Wells Marine, Inc., El Segundo, Calif. $1,606,893. 20mm projectiles. El Segundo. Frankford Arsenal, Philadelphia, Pa.

—Litton Systems, Van Nuys, Calif. $2,459,176. Data converter coordinated air defense systems. Van Nuys. Army Missile Command, Huntsville, Ala.

—Stokes Construction Co., San Marcos, Tex. $2,709,107. Construction of an administration and operations building at Bergstrom AFB, Tex. Engineer Dist., Fort Worth, Tex.

23—Construction, Ltd., Bordentown, N.J. $1,493,000. Construction of two mess hall buildings at Fort Belvoir, Va. Engineer Dist., Norfolk, Va.

—H. B. Zachry Co., San Antonio, Tex. $3,831,000. Construction of heliport facilities at Fort Wolters, Tex. Engineer Dist., Fort Worth, Tex.

—Stewart Warner Corp., Indianapolis, Ind. $1,274,209. Reciprocating compressors. Indianapolis. Mobility Equipment Command, St. Louis, Mo.

—Brunswick Corp., Sugar Grove, Va. $1,898,657. 35mm cartridge launchers. Marion and Sugar Grove, Va. Edgewood Arsenal, Md.

—Park Construction Co., Minneapolis, Minn. $1,837,171. Work on the Root River-Rush Creek Project. Rushford, Minn. Engineer Dist., St. Paul, Minn.

—Civil Works Constructors, Farmington, Mich. $2,246,385. Work on the Central and Southern Florida Flood Control Project. Okeechobee, Fla. Engineer Dist., Jacksonville, Fla.

—Eidal International Division of S. W. Factory, Inc., Albuquerque, N.M. $2,731,831. Trailer mounted laundry units. Albuquerque. Mobility Equipment Command, St. Louis, Mo.

—Muncie Gear Work, Muncie, Ind. $3,329,299. 2.75-inch rocket fin and nozzle assemblies. Muncie. Picatinny Arsenal, Dover, N.J.

24—American Mfg. Co. of Tex., Fort Worth, Tex. $1,190,000. Metal parts for 2.75 inch rockets. Fort Worth. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Maremont Corp., Saco, Maine. $1,461,747. 7.62mm machine guns with spare barrel and bi-pod assemblies. Saco. Army Weapons Command, Rock Island, Ill.

25—Honeywell, Inc., Hopkins, Minn. $6,855,484. Fuzes for bombs. Hopkins. Procurement Detachment, Chicago, Ill.

26—Thiokol Chemical Corp., Bristol, Pa. $6,380,011. Various types and amounts of ordnance. Marshall, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—U.S. Rubber Co., New York, N.Y. $21,890,855. Manufacturing explosives and loading of ammunition items. Joliet, Ill. Ammunition Procurement & Supply Agency, Joliet, Ill.

—General Time Corp., La Salle, Ill. $1,927,893. Fuzes for 105mm projectiles. La Salle. Frankford Arsenal, Philadelphia, Pa.

—Continental Motors, Muskegon, Mich. $5,607,339. Engine assemblies for the M48 tank. Muskegon. Tank Automotive Command, Warren, Mich.

—Continental Motors, Muskegon, Mich. $8,483,358. 1½, 3 and 6 horsepower engines. Milwaukee, Wis. Mobility Equipment Command, St. Louis, Mo.

—Colt's, Inc., Hartford, Conn. $2,943,592. M16 rifles. Hartford. Army Weapons Command, Rock Island, Ill.

—Bell Helicopter Co., Fort Worth, Tex. $3,417,954. Rotary wing blades for the UH-1 helicopter. Fort Worth. Aviation Materiel Command, St. Louis, Mo.

—Oberg Construction Corp., Northridge, Calif. $4,530,770. Work on the San Jose Creek Channel. Near Pomona, Calif. Engineer Dist., Los Angeles, Calif.

—Caterpillar Tractor Co., Peoria, Ill. $1,208,960. 18 heavy tractors. Peoria. Mobility Equipment Command, St. Louis, Mo.

—G. W. Galloway Co., Baldwin Park, Calif. $1,608,418. Containers for Shillelagh missiles. Ontario, Calif. Army Missile Command, Huntsville, Ala.

—A. O. Smith Corp., Chicago, Ill. $15,221,731. Metal parts for 750-lb. bombs. Waco, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Kanarr Corp., Kingston, Pa. $3,262,506. 40mm grenade launchers. Kingston. Army Weapons Command, Rock Island, Ill.

29—List & Clark Construction Co., Overland Park, Kan. $1,865,796. Work on the Stockton Reservoir Project. Dale and Cedar Counties, Mo. Engineer Dist., Kansas City, Mo.

—Day & Zimmerman, Philadelphia, Pa. $20,616,130. Miscellaneous components for medium caliber ammunition; loading, assembling and packing of medium caliber ammunition; and operating and maintenance activities at the Long Star Ammunition Plant, Texarkana, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Patton-Tully Transportation, Memphis, Tenn. $1,265,802. Construction work on the Mississippi River and tributaries channel improvement project. Near Caruthersville, Mo. Engineer Dist., Memphis, Tenn.

—Cummins Engine Co., Columbus, Ind. $3,277,074. Diesel engine assemblies for 10-ton trucks. Columbus. Tank Automotive Command, Warren, Mich.

—Bell Helicopter, Fort Worth, Tex. $1,000,000. Crash damage kits for UH-1 helicopters. $1,493,557. Quill assemblies for UH-1 helicopters. Fort Worth. Aviation Materiel Command, St. Louis, Mo.

31—R.C.A., Camden, N.J. $1,284,684. Portable man-pack radio sets. Camden. Electronics Command, Philadelphia, Pa.

—General Electric, Syracuse, N.Y. $4,967,740. Vehicle-mounted radar sets. Pittsfield, Mass. and Syracuse. Electronics Command, Philadelphia, Pa.

—Strong Electric Corp., Toledo, Ohio. $1,215,886. 70 search lights. Toledo. Electronics Command, Forth Monmouth, N.J.

—VARO, Inc., Garland, Tex. $3,000,000. Image intensifier assemblies. Garland. Electronics Command, Fort Monmouth, N.J.

—Sperry Rand Corp., Phoenix, Ariz. $1,066,234. Indicators for radio magnetic compasses. Salt Lake City, Utah and Phoenix. Southwest Procurement Detachment, Pasadena, Calif.

—Norris Industries, Los Angeles, Calif. $1,987,370. 90mm cartridge cases. Vernon, Calif. Southwest Procurement Detachment, Pasadena, Calif.

—AVCO Corp., Stratford, Conn. $17,016,583. T53-L-13 engines for UH-1 helicopters. Stratford. Aviation Materiel Command, St. Louis, Mo.

—Collins Radio Co., Addison, Tex. $1,263,474. Avionic kits for UH-1 helicopters. Addison. Aviation Materiel Command, St. Louis, Mo.

—Grumman Aircraft Engineering Corp., Bethpage, N.Y. $3,719,000. Modernization of OV-1B aircraft. $2,263,500. Modernization of OV-1C aircraft. Stuart, Fla. Aviation Materiel Command, St. Louis, Mo.

—Mack Trucks, Allentown, Pa. $5,434,800. Axle assemblies for 10-ton trucks. Allentown. Tank Automotive Command, Warren, Mich.

—White Motor Corp., Chicago, Ill. $1,217,115. Engineering services in support of M39 trucks. Chicago. Tank Automotive Command, Warren, Mich.

—General Motors, Detroit, Mich. $1,852,608. Trucks. Baltimore, Md. Tank Automotive Command, Warren, Mich.

—Bowen-McLaughlin-York, Inc., York, Pa. $1,721,850. Elevating drive assemblies and traversing drive assemblies for M107 and M110 vehicles. York. Tank Automotive Command, Warren, Mich.

—Stevens Mfg. Co., Ebensburg, Pa. $1,140,403. 2½-ton, 2-wheel trailer chassis. Ebensburg. Tank Automotive Command, Warren, Mich.

—Eaton, Yale & Town Mfg. Co., Batavia, N.Y. $3,636,780. Diesel engine-driven scoop loaders. Batavia. Mobility Equipment Command, St. Louis, Mo.

—Emerson Electric, St. Louis, Mo. $15,212,500. Armament subsystems—combination machine gun and grenade launcher—for Cobra helicopter. St. Louis. Weapons Command, Rock Island, Ill.

—Ford Motors, Dearborn, Mich. $2,261,170. Tractor trucks. Louisville, Ky. Tank Automotive Command, Warren, Mich.

—Chrysler Motors, Detroit, Mich. $11,700,000. ¾-ton trucks. Warren, Mich. Tank Automotive Command, Warren, Mich.

—Continental Motors, Mobile, Ala. $5,957,700. Engine assemblies, with containers, for rebuilding and refitting of combat vehicles. Mobile. Tank Automotive Command, Warren, Mich.

—Hercules Engine Corp., Canton, Ohio. $6,581,618. Engine assemblies for 2½-ton and five-ton trucks. Canton. Tank Automotive Command, Warren, Mich.

—Mason & Hanger—Silas Mason Co., Lexington, Ky. $6,007,330. Loading, assembling and packing of 750-lb. bombs. Grand Island, Neb. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Holson Defense Corp., Kingsport, Tenn. $5,750,296. Miscellaneous propellant and explosives. Kingsport. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Consolidated Box Co., Tampa, Fla. $1,544,187. Fiber containers for ammunition. Tampa. Ammunition Procurement & Supply Agency, Joliet, Ill.

—General Time Corp., LaSalle, Ill. $4,951,524. Time fuzes for 4.2-inch mortar projectiles and 105mm artillery illuminating shells. LaSalle. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Z D Products, El Segundo, Calif. $2,551,648. Ordnance components. El Segundo.

Ammunition Procurement & Supply Agency, Joliet, Ill.
—Corning Glass Works, Corning, N.Y. $1,818,887. Ceramic containers for aircraft munition dispensing systems. Martinsburg, W. Va. Ammunition Procurement Bridgeport. Ammunition Procurement and Supply Agency, Joliet, Ill.
—Dynamics Corp. of America, Bridgeport, Conn. $2,038,499. 60-cycle generator sets. Bridgeport. Ammunition Procurement & Supply Agency, Joliet, Ill.

NAVY

1—KDI Corp., Norwood, Ohio. $11,142,262. Mark 349 mechanical time fuses. Norwood. Ships Parts Control Center, Mechanicsburg, Pa.
—Litton Systems, Woodland Hills, Calif. $7,126,356. Equipment related to inertial navigational systems and computer systems of aircraft. Woodland Hills. Aviation Supply Office, Philadelphia, Pa.
—Ling-Temco-Vought, Greenville, Tex. $2,984,212. Services and materials for modification of ES-121K aircraft. Greenville. Naval Air Systems Command.
—All American Engineering Co., Wilmington, Del. $2,075,784. Arresting gear systems. Wilmington. Naval Air Engineering Center, Philadelphia, Pa.
—Atlantic Research Corp., Alexandria, Va. $1,490,160. Rocket motors for the Standard missile. Gainesville, Va. Naval Ordnance Systems Command.
—Stanwick Corp., Arlington, Va. $1,117,424. Engineering, studies, planning evaluation and related work in connection with overhaul of attack aircraft carrier USS Saratoga (CVA-60). Arlington. Naval Shipyard, Philadelphia, Pa.
—United Telecontrol Electronics, Asbury Park, N.J. $1,342,582. Airborne radar beacons. Asbury Park. Naval Air Systems Command.
—Lockheed Aircraft, Burbank, Calif. $1,826,407. Increased funding for modification of SP-2H aircraft. Burbank. Naval Air Systems Command.
—United Aircraft, East Hartford, Conn. $1,015,688. Stand assemblies used to support engines on F-111A aircraft. East Hartford. Navy Aviation Supply Office, Philadelphia, Pa.
2—Hughes Aircraft, Culver City, Calif. $72,212,800. Airborne missile control systems for Phoenix missiles. Culver City. Naval Air Systems Command.
—General Signal Corp., Woodbury, N.Y. $4,952,631. Decoders. Woodbury. Naval Ship Systems Command.
—Mine Safety Appliances Co., Pittsburgh, Pa. $2,219,496. Oxygen-breathing apparatus and canisters used by firefighting teams aboard ship. Evans City, Pa. Navy Ships Parts Control Center, Mechanicsburg, Pa.
—Magnavox Co., Fort Wayne, Ind. $2,000,000. Continued basic engineering and development of an air droppable ASW sonobuoy system. Fort Wayne. Naval Air Systems Command.
—LTV, Inc., Dallas, Tex. $1,588,600. Acquisition and installation of production equipment at Naval Weapons Industrial Reserve Plant, Dallas, Tex. Naval Air Systems Command.
—United Aircraft, Norwalk, Conn. $1,122,630. Indicators, transmitters, controls, and radar sets for A-6A aircraft. Norwalk. Navy Aviation Supply Office, Philadelphia, Pa.
—Atlas Fabricators, Long Beach, Calif. $1,076,953. Mark 76 practice bombs. La Mirada, Calif., and Murfreesboro, Tenn. Navy Ships Parts Control Center, Mechanicsburg, Pa.
—Douglas Aircraft, Tulsa, Okla. $1,070,000. Modification of three A-3B aircraft. Tulsa. Navy Purchasing Office, Los Angeles, Calif.
3—Aerojet-General Corp., Azusa, Calif. $41,256,598. Production of MK 46 torpedoes. Azusa. Naval Ordnance Systems Command.
—United Aircraft, East Hartford, Conn. $12,433,752. J-52-P-8A engines. East Hartford. Naval Air Systems Command.
—General Dynamics, Pomona, Calif. $9,550,000. Standard Arm missiles. Pomona. Naval Air Systems Command.
—Teledyne Systems, Hawthorne, Calif. $7,406,850. Self-contained navigation systems. Naval Air Systems Command.
—North American Aviation, Columbus, Ohio. $4,840,000. T-2B aircraft and related equipment. Columbus. Naval Air Systems Command.
—Sperry Gyroscope Co., Great Neck, N.Y. $3,874,586. Fabrication and test of prototype models of the Phase II Integrated Light Attack Avionics System. Great Neck. Naval Air Systems Command.
—Maxson Electronics, Old Forge, Pa. $3,036,960. Bullpup missiles. Old Forge. Naval Air Systems Command.
—Raytheon Co., Sudbudy, Mass. $2,100,786. Electronic guidance equipment and related support for the Poseidon weapon system. Sudbury. Special Projects Office.
4—Litton Systems, Inc., Woodland Hills, Calif. $4,866,113. Inertial navigation systems and special support equipment. Woodland Hills. Naval Air Systems Command.
—North American Aviation, Columbus, Ohio. $3,641,766. Airborne pod countermeasure sets. Columbus. Naval Air Systems Command.
—Stewart & Stevenson Services, Houston, Tex. $1,795,300. Variable-frequency acoustic diesel-generator sets, component parts, and engineering services. Houston. Naval Ship Systems Command.
—Curtiss-Wright Corp., Wood-Ridge, N.J. $1,464,023. Product support engineering services for J-65 engines. Wood-Ridge. Naval Air Systems Command.
5—Miami Beach, Yacht Corp., Miami Beach, Fla. $1,289,304. Motor whaleboats. Miami Beach. Naval Ship Systems Command.
—Hartman-Huyck Systems, Huntington Station, N.Y. $1,000,000. Components for the navigation system used in P-3A and P-3B aircraft. Huntington Station. Navy Aviation Supply Office, Philadelphia, Pa.
—Philco-Ford Corp., Palo Alto, Calif. $1,185,467. Maintenance and spare parts shelters used in support of Mobile (Helicopter) Landing Control Centers. Palo Alto. Naval Supply Center, Oakland, Calif.
8—Security Construction Co., Richmond, Va. $1,942,000. Addition to a fuel accessories overhaul building at Norfolk, Va., Naval Air Station. Atlantic Div., Naval Facilities Engineering Command, Norfolk, Va.
—G. L. Cory, San Diego, Calif. $1,087,670. Construction of an aircraft maintenance hangar at the Naval Auxiliary Air Station, Imperial Beach, Calif. Naval Facilities Engineering Command.
9—Honeywell, Inc., Hopkins, Minn. $62,970,157. Production of MK 46 torpedoes. Hopkins. Naval Ordnance Systems Command.
—Johns Hopkins University, Applied Physics Laboratory, Silving Spring, Md. $2,084,000. Work on the Talos weapon system. Silver Spring. Naval Ordnance Systems Command.
—Fairchild Camera & Instrument Corp., Paramus, N.J. $1,779,495. Radar sets, spare parts and engineering services. Paramus. Naval Ship Systems Command.
—Daniel Construction Co. of Virginia, Richmond, Va. $1,670,000. Construction of an air launch missile facility at the Naval Weapons Station, Yorktown, Va. Naval Facilities Engineering Command.
—Barry L. Miller Engineering, Hawthorne, Calif. $1,401,272. Fuzes for Walleye missiles. Hawthorne. Naval Air Systems Command.
10—General Precision, Inc., Binghampton, N.Y. $16,698,867. Seven F-4E weapon system training sets including support items. Palto Alto, Calif. and Binghampton. Naval Training Device Center, Orlando, Fla.
—University of Calif., Santa Barbara, Calif. $2,037,986. Oceanographic research. San Diego, Calif. Office of Naval Research.
—E. C. Young & J. W. Vickrey, El Cajon, Calif. $1,020,000. Construction of aircraft parking aprons at the Marine Corps Air Station, Santa Ana, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif.
12—John C. Grimberg Co., Rockville, Md. $3,145,000. Construction of a central heating plant at the Naval Academy, Annapolis, Md. Chesapeake Div., Naval Facilities Engineering Command, Washington, D.C.
—King-Hunter, Inc., Greensboro, N.C. $1,296,304. Construction of a combat direction annex at the Fleet Anti-Air Warfare Training Center, Dam Neck, Va. Atlantic Div., Naval Facilities Engineering Command, Norfolk, Va.
—John C. Grimberg Co., Rockville, Md. $1,007,000. Construction of a nitroglycerine plant at the Naval Ordnance Station, Indian Head, Md. Chesapeake Div., Naval Facilities Engineering Command, Washington, D.C.
—FMC Corp., Minneapolis, Minn. $1,110,000. Component parts for 5"/54 Mark 42, Mod 7 gun mounts. Minneapolis. Naval Ordnance Station, Louisville, Ky.
—Dillingham Corp., Honolulu, Hawaii $1,679,000. Construction of shoreline protection of Johnson Island, Hawaii. Pacific Div., Naval Facilities Engineering Command, Pearl Harbor, Hawaii.
—Granger Associates, Palo Alto, Calif. $1,036,549. Inverted cone, high frequency antennae. Palo Alto. Navy Purchasing Office, Washington, D.C.
—Irvin Para-Space Center, Glendale, Calif. $1,111,031. Mobile electric power plants used to supply power for aircraft in flight lines, ramps and in hangers. Glendale. Navy Purchasing Office, Washington, D.C.
—Sylvania Electronics Systems, Needham Heights, Mass. $1,933,519. Tactical Electronic countermeasures trainer with related services and materials. Needham Heights. Naval Training Device Center, Orlando, Fla.
15—Wells Industries, North Hollywood, Calif. $3,433,330. Starting systems for jet engine aircraft. North Hollywood. Naval Air Systems Command.
—United Aircraft, Stratford, Conn. $2,604,400. SH-3D helicopters. Stratford. Naval Air Systems Command.
—U.S. Steel, Pittsburgh, Pa. $2,598,179. 250-lb. bomb bodies. McKeesport, Pa. Navy Ships Parts Control Center, Mechanicsburg, Pa.
—Sperry Piedmont Co., Charlottesville, Va. $2,100,000. Field improvement kits for radar equipment aboard naval surface ships. Charlottesville. Naval Ship Systems Command.
—Sanders Associates, Nashua, N.H. $1,600,000. Classified electronics equipment. Nashua. Naval Air Systems Command.
—San Diego Marine Construction Co., San Diego, Calif. $1,222,680. 15 open lighters. San Diego. Naval Ship Systems Command.
16—Dyson & Co., Pensacola, Fla. $3,403,591. Construction of 250 family housing units at the Naval Air Station, Pensacola, Fla. Southeast Div., Naval Facilities Engineering Command, Charleston, S.C.
—General Precision, Inc., Glendale, Calif. $1,211,311. Production of MK 48 torpedo fire control systems. Glendale. Naval Ordnance Systems Command.
—Todd Shipyards Corp., Brooklyn, N.Y. $1,159,600. Overhaul of the destroyer tender USS Grand Canyon (AD-38). Brooklyn. Supervisor of Shipbuilding, First Naval Dist., Boston, Mass.
17—Foster Construction Co., Anaheim, Calif. $1,228,033. Construction of a testing-assembling-checkout facility for air-launched missiles, Fallbrook, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif.
—Hercules, Inc., Wilmington, Del. $1,224,000. To conduct solid propellant rocketry supporting research. Cumberland, Md. Naval Ordnance Systems Command.
18—Collins Radio Co., Cedar Rapids, Iowa. $2,606,315. Airborne UHF radio sets. Cedar Rapids. Naval Air Systems Command.
—Canadian Commercial Corp., Ottawa, Canada. $3,299,442. Structural components for the attack aircraft carrier USS Midway. Montreal, Canada. Navy Supply Center, Oakland, Calif.
19—McDonnell Douglas Co., St. Louis, Mo. $287,335,000. F-4E and RF-4C aircraft. St. Louis. Naval Air Systems Command.
—Rios Construction Co., San Diego, Calif. $1,713,444. Construction of BOQ with mess facilities at Camp Pendleton, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif.
—Johns Hopkins University, Applied Science Laboratory, Silver Spring, Md. $1,100,000. Research work on the Talos weapon system. Silver Spring. Naval Ordnance Systems Command.
22—General Dynamics, Pomona, Calif. $7,080,000. Production of the Standard missile. Naval Ordnance Systems Command.
—Harvey Construction Co., Manchester, N.H. $1,288,000. Construction of a sewage disposal system at the Portsmouth, N.H., Naval Shipyard. Northeast Div., Naval Facilities Engineering Command, Boston, Mass.
23—Westinghouse Electric Corp., Baltimore, Md. $27,600,000. Airborne radar sets. Baltimore. Naval Air Systems Command.
—General Precision, Glendale, Calif. $6,594,646. Major component for MK 113 torpedo fire control systems. Glendale. Naval Ordnance Systems Command.

—**Sperry-Rand Corp.,** Long Island City, N.Y. $1,091,870. Technical services in support of Tartar, Terrier and Talos missile systems. Long Island City. Navy Purchasing Office, Los Angeles, Calif.

24—**RCA,** Camden, N.J. $3,750,000. Radio sets. Camden. Naval Ship Systems Command.

—**Zenith Radio Corp.,** Chicago, Ill. $1,788,995. Classified radar equipment. Chicago. Naval Ship Systems Command.

—**Electromagnetic Technology Corp.,** Colmar, Pa. $1,587,190. Transistorized electronic counters and related data. Colmar. Naval Ship Systems Command.

—**Martin Marietta,** Orlando, Fla. $2,000,000. Missile launchers for various aircraft. Orlando. Navy Aviation Supply Office, Philadelphia, Pa.

25—**LTV Aerospace Corp.,** Dallas, Tex. $34,299,386. A-7B aircraft. Dallas. Naval Air Systems Command.

—**Lockheed Aircraft,** Marietta, Ga. $8,718,800. EC-130 aircraft. Marietta. Naval Air Systems Command.

—**Collins Radio Co.,** Cedar Rapids, Iowa. $4,424,212. Airborne communication, navigation and identification systems and components. Cedar Rapids. Naval Air Systems Command.

—**Bunker-Ramo Corp.,** Canoga Park, Calif. $2,432,309. Electronic counter-measure equipment. Silver Spring, Md. and Canoga Park. Naval Air Systems Command.

—**Lockheed Missiles & Space Co.,** Sunnyvale, Calif. $2,000,000. Modification of Polaris missile checkout equipment. $3,317,872. Design and development of training equipment for the Poseidon weapon system. Sunnyvale. Special Projects Office.

26—**Bermite Powder Co.,** Saugus, Calif. $12,862,680. Production of MARK 24 parachute flares. Saugus. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**Texas Instruments,** Dallas, Tex. $6,192,021. Wing and fin sets and guidance and control sections for Shrike missiles. Dallas. Naval Air Systems Command.

—**Raytheon Co.,** Bedford, Mass. $3,000,000. Design and development on Sparrow III missiles. Bedford. Naval Air Systems Command.

—**General Instrument Corp.,** Chicopee, Mass. $2,692,242. Fuzes for 250 and 500-lb. bombs. Chicopee. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**Sperry Rand Corp.,** Bristol, Tenn. $2,555,621. Wing and fin sets, and guidance and control sections for Shrike missiles. Bristol. Naval Air Systems Command.

—**Kaman Aircraft,** Colorado Springs, Colo. $1,506,400. Classified services in connection with the Fleet Ballistic Missile Weapon System. Colorado Springs. Special Projects Office.

—**Stanford Research Institute,** Menlo Park, Calif. $1,481,101. Naval operations research. Menlo Park. Office of Naval Research.

—**Philco-Ford Corp.,** Palo Alto, Calif. $1,128,960. Landing control central shelters used for control of helicopter traffic. Oakland, Calif. Naval Supply Center, Oakland, Calif.

29—**Mathiasen Tanker Industries,** Philadelphia, Pa. $92,000,00. Services. Military Sea Transportation Service.

—**Marine Transport Lines,** New York, N.Y. $101,000,000. Services. Military Sea Transportation Service.

—**American Mfg. Co. of Tex.,** Fort Worth, Tex. $7,330,400. Eight-inch projectiles. Fort Worth. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**General Electric,** Cincinnati, Ohio. $8,981,348. $3,708,929. J79-GE-10 engines for F-4J aircraft. Cincinnati. Navy Aviation Supply Office, Philadelphia, Pa.

—**Hughes Aircraft,** Culver City, Calif. $2,031,000. Phoenix missile system funding. Naval Air Systems Command.

—**Norris Industries,** Los Angeles, Calif. $1,996,400. Cartridge cases for eight-inch projectiles. Los Angeles. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**I.T.&T.,** Nutley, N.J. $1,000,000. Airborne receiver transmitters. Nutley. Naval Air Systems Command.

31—**General Motors,** Indianapolis, Ind. $3,321,200. Kits for T56-A16 engines. Indianapolis. Aviation Supply Office, Philadelphia, Pa.

—**Whiting-Turner Construction Co.,** Memphis, Tenn. $1,747,000. Construction of a 4,000-man building at Memphis Naval Air Station. Southeast Div., Naval Facilities Engineering Command, Charleston, S.C.

—**Frank J. Rooney, Inc.,** Miami, Fla. $1,297,669. Construction of a training building at the Naval Training Center, Orlando, Fla. Southeast Div., Naval Facilities Engineering Command, Charleston, S.C.

—**Teledyne Inc.,** Berwick, La. $3,242,000. Aluminum-constructed fast patrol boats. Berwick. Naval Ship Systems Command.

—**Sperry Rand Corp.,** St. Paul, Minn. $1,590,280. Production of fire control digital computers and related equipment for Talos missiles. St. Paul. Naval Ordnance Systems Command.

—**Western Electric,** New York, N.Y. $1,272,000. Oceanographic research, Whippany, N.J. Navy Purchasing Office.

—**AiResearch Mfg. Co.,** Phoenix, Ariz. $1,082,083. Spare parts for T76-G-10/12 engines for OV-10A aircraft. Phoenix. Aviation Supply Office, Philadelphia, Pa.

—**Bethlehem Steel Corp.,** Baltimore, Md. $1,224,000. Regular overhaul of the oiler USS Chukawan (AO-100). Baltimore. Supervisor of Shipbuilding, Fifth Naval Dist., Norfolk, Va.

MARINE CORPS

2—**FMC Corp.,** San Jose, Calif. $2,819,547. Roadwheel caps and assemblies for amphibious vehicles. San Jose. Headquarters, Marine Corps.

15—**Magline, Inc.,** Pinconning, Mich. $1,248,332. Shelter and handling systems used to assemble aircraft ordnance. Pinconning. Headquarters, Marine Corps.

17—**G. C. Dewey Corp.,** New York, N.Y. $2,700,000. Communications and radar equipment. New York. Headquarters, Marine Corps.

22—**Canadian Commercial Corp.,** Ottawa, Canada. $5,629,895. Telegraph-telephone terminal sets. Campbellton, New Brunswick. Headquarters, Marine Corps.

AIR FORCE

2—**TRW, Inc.,** Rendondo Beach, Calif. $1,283,000. Work on space-ground communications. Redondo Beach. Space Systems Div., (AFSC), Los Angeles, Calif.

—**Avion Electronics,** Paramus, N.J. $1,123,609. Production of airborne radar beacons. Paramus. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

3—**Irving Air Chute Co.,** Lexington, Ky. $1,442,343. Production of aircraft cargo tie-down nets. Lexington. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—**Eastern Rotocraft Corp.,** Doylestown, Pa. $1,463,904. Production of aircraft cargo tie-down nets. Doylestown. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—**Honeywell, Inc.,** Hopkins, Minn. $13,485,000. Production of bomb components. Hopkins. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Collins Radio Co.,** Cedar Rapids, Iowa. $3,365,000. Ultra High Frequency Terminals for Tactical Satellite Communications Operational Feasibility Test Program. Cedar Rapids. Electronic Systems Command (AFSC), L. G. Hanscom Field, Mass.

4—**General Electric,** Cincinnati, Ohio, $32,111,000. Production of J-79-15 and J-79-17 aircraft engines. Evendale, Ohio. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Bendix Corp.,** Teterboro, N.J. $2,782,863. Production of electronic data processing equipment. Teterboro. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Litton Systems, Inc.,** Woodland Hills, Calif. $4,173,000. Avionics subsystems for F-4 aircraft. Woodland Hills. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

5—**Boeing Co.,** Seattle, Wash. $3,438,701. Design, development and testing of missile trajectory prediction systems and related equipment. Seattle. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—**General Motors,** Indianapolis, Ind. $1,200,000. Aircraft engine development. Indianapolis. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**AVCO Corp.,** Richmond, Ind. $3,000,000. Production of fuzes and related equipment for aircraft ordnance. Richmond. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

8—**Varo, Inc.,** Garland, Tex. $3,441,785. Production of aircraft ordnance ejector racks. Mexia, Tex. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—**General American Transportation Corp.,** Niles, Ill. $1,162,020. Production of bomb components. Niles. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Universal Comptronics Corp.,** Thornwood, N.Y. $1,062,720. Production of communications equipment. Thornwood. Warner-Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

9—**Radiation Inc.,** Melbourne, Fla. $2,873,240. Construction of a large, space-oriented antenna. Melbourne. Space Systems Div., (AFSC), Los Angeles, Calif.

10—**Adams Russell Co.,** Waltham, Mass. $1,326,741. Production of antenna systems for B-52 aircraft. Waltham. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

—**Batesville Mfg. Co.,** Batesville, Ark. $1,081,968. Bomb components. Batesville. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

11—**AVCO Corp.,** Richmond, Ind. $9,058,000. Production of aircraft ordnance fuzes, containers and related equipment. Richmond. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Lockheed Missiles & Space Co.,** Sunnyvale, Calif. $5,306,569. Launch services for the Agena rocket from April 1966 to September 1967. Vandenberg AFB, Calif. Space Systems Div., (AFSC), Los Angeles, Calif.

—**General Electric,** West Lynn, Mass. $5,105,636. Production of T-58 engines for helicopters. West Lynn. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

12—**Douglas Aircraft,** Santa Monica, Calif. $1,300,000. Production of space boosters. Santa Monica. Space Systems Div., (AFSC), Los Angeles, Calif.

17—**Bendix Corp.,** North Hollywood, Calif. $1,061,884. Production of airborne radar equipment. North Hollywood. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Martin-Marietta,** Orlando, Fla. $3,504,550. Test and development of aircraft targeting systems. Orlando. Air Proving Ground Center, Eglin AFB, Fla.

18—**Lockheed Aircraft,** Sunnyvale, Calif. $5,000,000. Work on the satellite control network. Sunnyvale. Air Force Satellite Control Facility, Los Angeles, Calif.

—**Grumman Aircraft Engineering Corp.,** Bethpage, N.Y. $3,200,000. Modification to S-2D aircraft. Bethpage. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**AVCO Corp.,** Cincinnati, Ohio. $2,844,844. High frequency radio sets and related equipment. Cincinnati. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Corning Glass Works,** Corning, N.Y. $1,468,000. Optical glass. Corning. Systems Engineering Group, (AFSC), Wright-Patterson AFB, Ohio.

19—**North American Aviation,** Anaheim, Calif. $1,900,000. Maintenance, repair, overhaul and modification of Minuteman guidance and control systems. Anaheim. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—**McDonnell Douglas Corp.,** Santa Monica, Calif. $2,124,484. Launch support services from April 1967 to September 1968 at the Western Test Range, Vandenberg AFB, Calif. Space Systems Div., (AFSC), Los Angeles, Calif.

—**Lockheed Aircraft,** Burbank, Calif. $1,228,270. Modification of F-104 aircraft. Palmdale, Calif. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

—**Northrop Corp.,** Hawthorne, Calif. $1,247,000. Development work on rocket guidance systems. Hawthorne. Systems Engineering Group, Research and Technology Div., (AFSC), Wright-Patterson AFB, Ohio.

22—**General Motors,** Hudson, Ohio. $2,631,042. Production of heavy loading equipment with adverse terrain capability. Euclid, Ohio. Aeronautical Systems Div., (AFSC). Wright-Patterson AFB, Ohio.

—**General Dynamics,** Fort Worth, Tex. $2,907,221. Machine tool modernization. Fort Worth. Aeronautical Systems Div., (AFSC), Wright-Paterson AFB, Ohio.

—**General Motors,** Indianapolis, Ind. $7,020,000. Production of T-56 turbo-prop engines and related equipment. Indianapolis. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Thokol Chemical Corp.,** Bristol, Pa. $1,500,000. Production of Stage I Minuteman motors, Brigham City, Utah. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—**I.B.M.**, Owego, N.Y. $1,332,844. Work on the radar system on B-52 aircraft. Owego. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

—**General Electric**, West Lynn, Mass. $10,-742,400. J-85 engines for F-5 aircraft. West Lynn. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

24—**Sylvania Electronics Products, Inc.**, Williamsville, N.Y. $1,240,000. Work on a tactical communication satellite test program. Williamsville. Electronics Systems Div., (AFSC), L. G. Hanscom Field, Mass.

25—**Bendix Corp.**, Davenport, Iowa. $2,860,-791. Production of airborne computer components. Denver, Colo. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**United Technology Center**, Sunnyvale, Calif. $59,850,000. 120-inch solid fuel rocket motors. Sunnyvale. Space Systems Div., (AFSC), Los Angeles, Calif.

26—**General Electric**, West Lynn, Mass. $7,-378,000. Production of T-58 helicopter engines. West Lynn. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Philco-Ford Corp.**, Fort Washington, Pa. $3,750,000. Production of a semi-automatic tactical air control system. Fort Washington. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass.

—**Douglas Aircraft**, Tulsa, Okla. $1,465,056. Production of modification kits and inspection and repair of B-66 aircraft. Tulsa. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—**Collins Radio Co.**, Cedar Rapids, Iowa. $1,392,082. Production of communications equipment. Cedar Rapids. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

29—**Thiokol Chemical Corp.**, Huntsville, Ala. $1,600,000. Production of solid rocket motors. Huntsville. Space Systems Div., (AFSC), Los Angeles, Calif.

—**General Dynamics**, San Diego, Calif. $1,-691,000. Repair and modification of Atlas launch vehicles. San Diego. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—**Watkins-Johnson Co.**, Palo Alto, Calif. $3,-460,000. Production of communications equipment. Palo Alto. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Northrop Corp.**, Hawthorne, Calif. $4,-606,944. Production of long lead time components for F-5 aircraft. Hawthorne. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**General Electric**, Valley Forge, Pa. $110,-020,000. Experiment integration work on the Manned Orbiting Laboratory. Valley Forge. Space Systems Div., (AFSC), Los Angeles, Calif.

31—**Northrop Corp.**, Anaheim, Calif. $4,946,-588. Production of aircraft rocket warheads. Anaheim. Aeronautical Systems Div., (AFSC), Wright-Patternson AFB, Ohio.

—**General Precision**, Binghampton, N.Y. $1,-127,002. Production of instrument flight trainers. Binghampton. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Goodyear Aerospace Corp.**, Akron, Ohio. $1,962,483. Production of air transportable photographic laboratories. Akron. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**American Electric, Inc.**, La Mirada, Calif. $1,347,608. Production of external fuel tanks for F-101 aircraft. La Mirada. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

Fifth Army Headquarters Moved

Headquarters, Fifth U.S. Army has been moved from Chicago, Ill., to Fort Sheridan, Ill.

The new mailing address is:

Commanding General
Fifth U.S. Army
Attn: (appropriate staff office symbol)
Fort Sheridan, Ill. 60037

Military Prime Contracts Awards by Commodity Category

[Editor's Note: Below is a table of military prime contract awards for the first 10 months of FY 1967. The contract information in the summary is broken down by major commodities for the current fiscal year and includes, for comparative purposes, corresponding information for the same period in the last fiscal year.

This is the second summary to be published in this form in the Defense Industry Bulletin, *and is one of a series planned to be issued periodically by the Defense Department. The first summary was published in the April 1967 issue of the* Bulletin.]

(Amounts in Millions)

	July 1966 April 1967	July 1965 April 1966	Net Change
Aircraft	$ 7,492	$ 5,572	$1,920
Missile and Space Systems	3,705	3,687	18
Ships	1,865	1,069	796
Tank-Automotive	883	1,034	151
Weapons	387	305	−151
Ammunition	2,342	1,910	432
Electronics and Communications	3,032	2,587	445
Other Hard Goods	2,019	1,758	261
Hard Goods (Sub-Total)	$21,725	$17,922	$3,803
Subsistence	900	822	78
Textiles and Clothing	954	853	101
Fuels and Lubricants	1,022	879	143
Soft Goods (Sub-Total)	$ 2,876	$ 2,554	$ 322
Construction	705	725	−20
Services	2,827	2,033	794
All Actions Under $10,000 Each	3,291	2,876	415
Total [1]	$31,424	$26,110	$5,314

[1] Excludes work done outside the United States and also excludes civil functions (rivers and harbors work) of the Army Corps of Engineers.

The increases are for the most part associated with the current military action in Southeast Asia. By far the largest increase ($1.9 billion) is for aircraft, largely fighter planes, helicopters and cargo planes. Ships increased by $0.8 billion, mostly for escort ships and landing craft. Services increased $0.8 billion, large for air and sea transportation.

DEFENSE PRIME CONTRACT AWARDS TO SMALL BUSINESS

(Amounts in Thousands)

	March 1967 July 1966	July 1965 March 1966
Procurement from All Firms	$28,156,201	$22,771,684
Procurement from Small Business Firms	5,707,396	4,903,686
Percent Small Business	20.3	21.5

OFFICE OF THE SECRETARY OF DEFENSE
WASHINGTON, D. C. 20301

OFFICIAL BUSINESS

POSTAGE AND FEES PAID

AFSC Electronics Systems Division Gets Key Role in Development of TACSATCOM

The Air Force Systems Command's Electronic Systems Division (ESD), L. G. Hanscom Field, Mass., has been assigned a key role in the development of the first tactical satellite communications system for the Defense Department. ESD will carry out a feasibility test program, the prelude to a production go-ahead, and will develop many of the projected system's mobile terminals—airborne, ground-mobile and shipborne.

The tests will measure technical performance in situations resembling real, operating conditions. This phase of the project will use a limited number of mobile terminals or transceivers widely dispersed in or near the continental United States, and a solar powered payload in outer space.

Almost all terminals or stations in future tactical systems will be mobile, rather than fixed. Each of the Military Services will specify its own requirements for the mobile terminals which, despite different configuration, will have identical capabilities.

The Navy will have transceivers on board surface vessels, helicopters, fighter aircraft and submarines; the Army will have equipment on jeeps, trucks, and combat team backpacks; and the Air Force will have its gear not only on its aircraft but also on mobile ground stations. All will be tuned into the wavelength of the sky-high satellite.

The satellite communications system, bearing the acronym TACSATCOM, will be capable of handling a large number of calls or messages at one time by providing a single point relay directly to and from a commander and his tactical units in the field. When completed, the system will be the forerunner of satellite communications designed for the use of highly mobile military units.

Lieutenant Colonel Edgar A. Grabhorn, USAF, is the ESD program manager for the TACSATCOM system.

M16A1 Rifle Adopted as Standard Army Weapon

The M16A1 rifle (previously the XM16E1) has been adopted as a standard Army weapon in addition to the M–14 rifle now in general use. U. S. Army forces in Europe will continue to use the M–14 which fires the standard NATO 7.62mm cartridge.

The standardization of the M16A1 for general Army use was made after a two-year study in which several small arms systems were evaluated and tested. The study concluded that, while the heavier M–14 is slightly superior to the M16A1 in effects on targets at ranges beyond 300 meters, the M16A1 is equal or superior at shorter ranges where targets are usually engaged.

Designed to fire 5.56mm (.223 caliber) ammunition, the M16-A1 weighs only a little over six pounds. This reduced weight will allow reduction of the individual soldier's combat load, supply tonnages and, ultimately, costs. Procurement schedules will take into account the number of weapons on hand, requirements of other Services and allies, and the Military Assistance Program.

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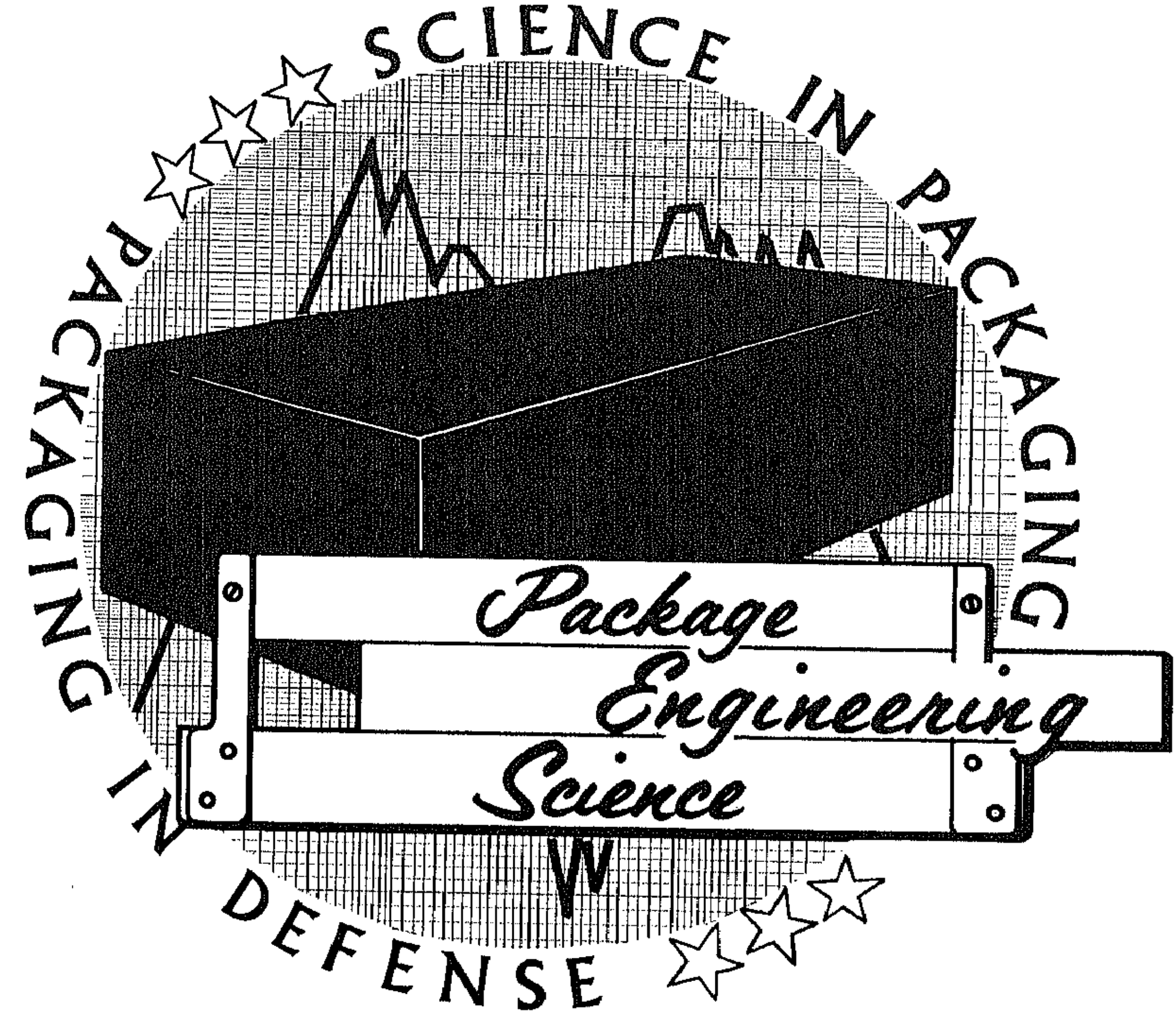

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FEATURES

DEPARTMENTS

The *Defense Industry Bulletin* is published monthly by the Business & Labor Division, Directorate for Community Relations, Office of the Assistant Secretary of Defense (Public Affairs). Use of funds for printing this publication was approved by the Director of the Bureau of the Budget.

The purpose of the *Bulletin* is to serve as a means of communication between the Department of Defense (DOD) and its authorized agencies and defense contractors and other business interests. It will serve as a guide to industry concerning official policies, programs and projects, and will seek to stimulate thought by members of the defense-industry team in solving the problems that may arise in fulfilling the requirements of the DOD.

Material in the *Bulletin* is selected to supply pertinent unclassified data of interest to the business community. Suggestions from industry representatives for topics to be covered in future issues should be forwarded to the Business & Labor Division.

The *Bulletin* is distributed without charge each month to representatives of industry and to agencies of the Department of Defense, Army, Navy and Air Force. Requests for copies should be addressed to the Business & Labor Division, OASD(PA), Room 2E813, The Pentagon, Washington, D.C. 20301, telephone, (202) OXford 5-2709.

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DEFENSE INDUSTRY

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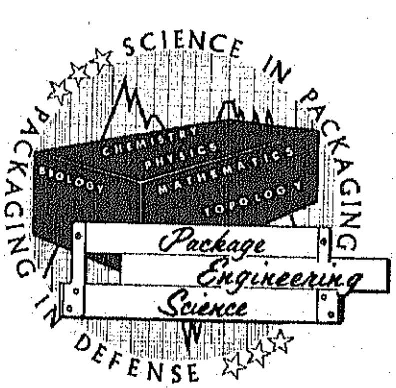
Solving Packaging Problems Through Research and Development

Dr. Edward A. Nebesky
Dr. Martin S. Peterson

A short and simple reason why the Army is interested in solving packaging problems through research and development is this: there is no other way to do it. A century ago packaging supplies for the combat soldier was the job of craftsmen, and the requirements were not much more rigorous than they were for civilian users. Today, military requirements for packaging are written in response to a revolution in the traditional concept of warfare—a revolution that has enormously increased the mobility of the Army, its firepower, and its capability for sustaining itself in combat.

To get down to cases, packages must be adapted to rapid, labor-saving materials handling media. They must protect their contents against agents of destruction totally unknown 100 years ago, and they have to fit snugly into sharply defined systems, *e.g.*, combat feeding systems. The tare weight of packages today is of vital concern—not one extra ounce can be tolerated. Higher strength of container materials is required without any increase in weight. Increased storage life, easier removal of contents, re-use after the initial use, better patterning of loads, proper safeguarding of chemical supplies, reduction in cost—these and many other problems can no longer be solved by the craftsman.

Packaging research at the U.S. Army Natick Laboratories has set forth on a dynamic, imaginative long-range program with an ambitious goal—complete correlation of packaging with the military product and military supply line operations. Increasingly, it is being recognized that there is no category of military equipment and supplies which can be held any longer at *status quo*. Containers must be based on new, or at least greatly improved, design and construction concepts and, equally important, be tailored to the requirements of the product (often a brand new product), of the transportation media (widely varied as to air, land and sea vehicles and cargo sizes and shapes), and of the environment (sharply different from one zone to the next, both in climate and terrain). Combat success depends on men, to be sure, but also on the efficiency and



sufficiency of equipment and supplies in the "get thar fusteth with the mostest" principle.

The role of the container in keeping the supply stream flowing is too well recognized to be described here, but what may not be so well recognized is the need to lift packaging research and development to a level compatible with the impressive advances made, and being made, in materiel. Packaging is a science and, as such, is no different or no less important than product formulation, quality control, or processing (manufacturing) operations, and science must be put into packaging.

It was with this goal in mind that a new look at and a new approach to the U.S. Army Natick Laboratories' Packaging Research Program was recently taken, and a unified network of tasks under three coordinated projects drawn up.

Three Avenues to the Goal

The three avenues to the attainment of the packaging research and development goal are:

- Packaging performance evaluation.
- New packaging engineering systems.
- Applied container engineering development.

Under the first, container performance data derived during actual mobility supply operations will be collected and translated into container design and construction criteria. Under the second approach, the design of new packaging engineering systems, such advanced concepts as a universal container system, will be studied and implemented. Under the third, applications of container engineering developments to the packaging of products individually, by category, or in combination, will be made.

Since the bare description of these three approaches may not suggest anything particularly novel in the field of container research and development, it will be the next order of business to point out what is new in each of these pathways to the goal and the pay-off for the Army.

Packaging Performance Evaluation Criteria

The successive environments to which a container is exposed on its journey up to the front area range from mild to harsh. When loaded containers leave the factory shipping dock, the first leg of this journey is

likely to be easy, with no more than the usual amount of jolts, vibrations and abrasions sustained in the domestic transportation of supplies. The next leg of the journey, shipment or transshipment overseas by plane or ship, may be but little more rough. When a container reaches its detination, say a port in South Vietnam, it leaves the world of well equipped transport media, smooth supply routes, ideal climatic environment, and orderly handling, and enters on a new phase of its journey, the harsh part.

To evaluate packaging performance, the effects of the whole cycle of operations from factory to field, and in the field, under all types of adverse climatic and environmental conditions, must be collected and analyzed. This has never been done before in a systematic, scientific manner. Moreover, observations of actual packaging performance in the past have been visual, supplemented by tests after the facts.

What is needed, and what is already well under way, is an objective scientific system, one based on recording devices (placed in selected containers of a shipment) that will accurately measure the effects of physical and other environmental shocks. Once experimental data, obtained over a wide range of transport media, routes and regions, have been collected and analyzed, new laboratory test methods and techniques will be devised, correlating environmental effects with predictions of container performance. By these means, a science-oriented engineering capability for designing and constructing military containers can be achieved.

The term "science-oriented" applied to packaging research may be viewed a bit skeptically by the practical man, but it is by no means a pretentious description. A container structure that will stand up can be designed by almost anyone, but a container structure that will stand up to military supply line punishment is something else again. In the first place, a container has to be "optimized," *i.e.*, factors of money, materials, structural strength adequate (and not super-adequate) for the job, and a configuration suited to transport, handling, storing, and field use must be considered and brought to a proper balance. For example, take one area of concern, physical shock. A variety of physical forces impact on a container. What can be done to neutralize or at least modify those forces? The answer can only be found in structural analysis, a complex and difficult field. In another area, materials deterioration, the application of chemistry and microbiology is required. As to optimal configurations, the job has to be done by the mathematician or topologist. It is probable that the computer will have to be employed for many performance evaluation tasks.

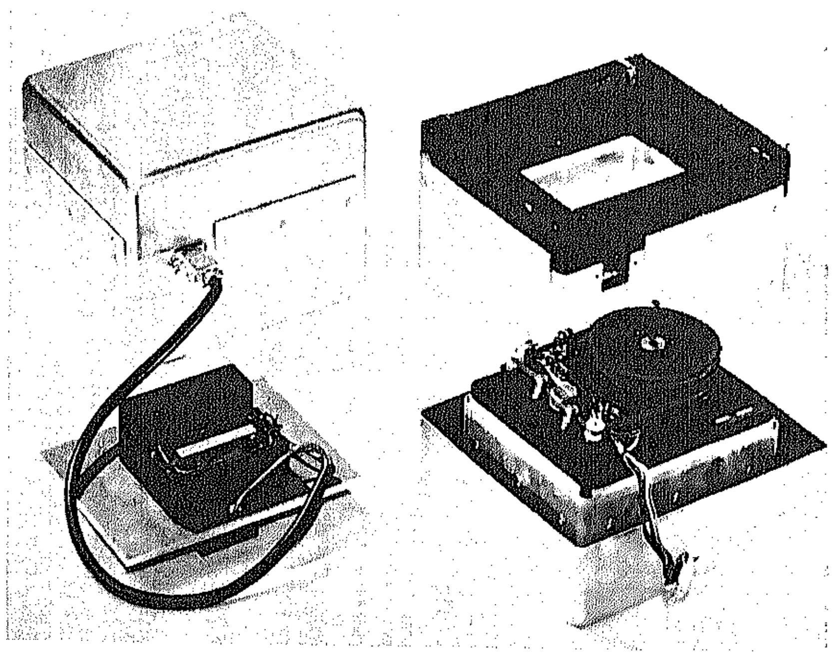
New Packaging Engineering Systems

The word "systems" is used here in a technical rather than a military sense. For example, a packaging system for radiated foods is a technical system that must fit into a military feeding system. Packaging engineering systems are not unknown today, but with advances in combat development systems we shall need to look ahead to a day when it will be possible, given the proper scientific and technological capability, to design and construct not a multiplicity of systems but a "universal container system"—capable of use in any military supply system and fitted well to the overall military supply system.

With the abundance of new packaging materials available today, with the new packaging methods being devised, with the new concepts of distribution, it is essential that the fabrication and construction of tomorrow's packages and containers be designed to incorporate the reliability and necessary protection of product for its intended storage life, mission purposes, and combat conditions. The time to start is now.

Applied Container Engineering Development

It is well accepted today that the container is as important as its contents. This statement is especially applicable to the complicated task of supplying the overseas military consumer. Unless the package carries the product safely to the user, the product might as well never have been made. Waste due to package failure is not only a waste of money, it is a waste of combat power. Moreover, since supplying the modern combat soldier calls for specialized containers, such as a containerized "B" ration, unitized on a meal basis, the business of engineering a package to respond to a specific military situation is firmly founded on the axiom that a product must not only arrive



Recording instrument for measuring shipping container performance during shipment and transshipment of supplies from point of origin to destination. The instrument records data on physical shocks sustained in transport media and storage.

ard A. Nebesky is Acting Di- f the General Equipment and ag Laboratory at the U.S. Natick (Mass.) Laboratories. assuming this position, he ector of the Graduate Pack- enter at Rutgers University.

Dr. Martin S. Peterson is a supervisory physical scientist at the U.S. Army Natick (Mass.) Laboratories. He entered Federal service in 1947 and from 1952 to 1960 was editor of two professional journals, Food Research and Food Technology.

ombat area destination but be quickly usable, *i.e.*, "open- distributable" after it gets

ese reasons, the task of pack- search will be to analyze all situations where packaging or and devise packaging sys- l methods responsive to mili- uirements. Heavy containers drummed out of the supply Wherever possible, we must antage of modern science and y to design and construct ight containers; follow by close coordination with to their construction; and stantly aware of their per- in the supply lines, under late of the first approach, performance evaluation. No g engineering system will be salt, however, unless it in- smoothly with the supply hich it serves, with tactics, overall strategy. In the past, ne supplies have been bog down an army and defeat. Modern packaging can eliminate such a catas-

Integrating the Three Approaches

Applied container engineering development, the third approach to the goal of a science-oriented packaging research program, is by no means isolated from the other two approaches. All three approaches are interconnected and interdependent.

To illustrate how this works, ideally, consider the concept of the universal container system. A very considerable body of performance evaluation data would be required and analyzed, before the criteria for this advanced system could be established. The optimal design will have to be determined, of course, by model analysis. Model analysis will involve:

- Particularizing broad intuitive assumptions concerning the model mathematically, by means of the computer.
- Studying each part of the system separately.
- Meshing the whole universal container system into the military supply system taken as a whole.

To restate this concept in more concrete terms, a universal container system will be one where each type of container not only does its job, but interacts with other types of containers to assist them in doing theirs. An example, no doubt farfetched in terms of today, would be a collapsible barracks, with equipment and supplies, all in one package. Nevertheless, we should be thinking in terms of the amount of work a given container can perform; how it can take over, in part, the work of another container; and how, by extending this principle, we can substantially reduce the burden on supply operations.

Some of the basic principles of a universal container system have already been vaguely outlined. Examples are: containerizing containers; standardization of container sizes and configurations; efforts to obtain a universal container material; the development of multi-use containers; and, thinking now of military systems and how a universal container system could mesh in with it, the increasing attention being given to the effect of one component of a system on all other components. Under the new packaging engineering systems approach, special attention will be given to this important modern principle of military supply systems just mentioned.

It need hardly be reiterated that, with these challenges ahead, packaging research must utilize all of the tools of modern science, technology, and engineering. The U.S. Army Natick Laboratories has made a beginning.

The Planning Philosophy of the New Long-Range Program

It should be evident from the foregoing account that the new plan does not try to tell the Army what it ought to have in the way of containers, nor to sell the Army on specific containers. The plan does call for an investment of scientific, engineering and technological effort that will be responsive to current and foreseeable military needs. The keystone of this planning philosophy is constant coordination of container development with military operational planning to assure that packaging research is fully abreast of progress in Army materiel. One important purpose of this article will have been fulfilled if we have made it clear how we are going to translate philosophy into achievement.

Naval Ordnance and Industry

On May 1, 1966, the Secretary of the Navy established the Naval Ordnance Systems Command as part of a major reorganization of the Navy. Now this stripling has the effrontery to celebrate its 125th anniversary!

Actually, Naval Ordnance has undergone a century and a quarter of continuous operation: Born as the Bureau of Ordnance and Hydrography in 1842, it shortly assumed the simpler title of Bureau of Ordnance. After 117 years of independent operation, the Bureau of Ordnance merged with the Bureau of Aeronautics in 1959 into the Bureau of Naval Weapons. The merger lasted only six and one-half years and then once again the Naval Ordnance Systems Command assumed its separate identity.

When we speak of the Naval Ordnance Systems Command, we are really referring to a team composed of the command itself as well as a tremendous segment of American industry. One of these segments alone could not have been responsible for the great progress that has always been the hallmark of Naval Ordnance.

Today the Naval Ordnance Systems Command takes special pride in such effective weapon systems as the Standard Missile, the Torpedo MK 46 and ASROC. Tomorrow there will be equal pride in newer weapon systems such as the Advanced Surface Missile System, the Torpedo MK 48 and the Extended Range ASROC. Industry, which has participated in and will continue to participate in so much of the effort for research and development and for production of these systems, must share this pride with the Naval Ordnance Systems Command.

The team relationship of the Naval Ordnance Systems Command and American industry is not one of master and servant by any stretch of the imagination. While it is true that the command, as the ordnance-procuring activity for the Navy, must set forth the Navy's requirements, it is also true that these requirements result from research by both members of the team. The hardware utilized by the Fleet was spawned in both Naval Ordnance and in private industrial laboratories. Even production of a single end item has been handled concurrently in a Naval Ordnance factory and in a private industrial plant and, in some cases, private industry has purchased Naval Ordnance factories and has completed the production of hardware which was in process at the time of purchase.

The Naval Ordnance Systems Command is a vast complex consisting of the headquarters, located in Washington, D.C., and a far-flung field organization. Although the Naval Ordnance-industry team works together at headquarters and in the field, this article will pertain to the activities of headquarters where the major programs are centered. Industry works with Naval Ordnance in the field in the same manner as at headquarters, so that a description of headquarters activities applies also to the field.

Naval Ordnance-Industry Relationship

The focal point of American industry's relationship with the Naval Ordnance Systems Command is the command's Contracts Office. The Director for Contracts operates the Industry Liaison Branch whose effort is devoted entirely to furthering the Naval Ordnance-industry team concept. For new industrial firms, for older firms which have not worked with Naval Ordnance before, and for firms that are veterans in working with Naval Ordnance, the Industry Liaison Branch provides an initial point of contact. It directs representatives of industry to the appropriate offices within or outside the Contracts Office for discussing the business at hand.

The Armed Services Procurement Regulation requires that bidder mailing lists be maintained "by purchasing activities to insure access to adequate sources of supplies and services . . . ."

The Industry Liaison Branch is the focal point for Naval Ordnance-industry review, and it is here that the Master Bidders List is maintained. Command purchasing officers use this list to solicit proposals, quotations and bids from contractors.

Companies make known their desire to participate in the procurement program of the Naval Ordnance Systems Command by mail or in person. In either case, they are given an explanation of the everyday mechanics of the procurement system, information on the general scope of the command's procurement program, and the method for applying for inclusion in the Master Bidders List. Each contractor receives application forms, an Industry Interest List, and is encouraged to give a full picture of his capabilities and facilities.

The Industry Evaluation Office routes each potential contractor's application to the cognizant technical and management personnel in the command for evaluation. After review, the firm receives notification of its status and any other information which may be appropriate in individual cases. The firm then knows the types of services or materials for which the command may solicit its offers.

Prospective manufacturers, who normally produce supplies and equipment not procured by Naval Ordnance, receive information as to which government activities may be interested in their production.

Two other functions connected with Naval Ordnance-industry relations are assigned to the Industry Evaluation Office. One is the synopsizing of proposed Naval Ordnance procurement in the *Commerce Business Daily*, a means of notifying industry for contracting or subcontracting. The other is the service of providing copies of solicitation documents, upon request, to interested suppliers who have not been included in the solicitations, but may have learned of them through the *Commerce Business Daily* or other sources.

The Contracting Officer

Within the Contracts Office, industry's major contact is with the contracting officers. A contracting officer awards every contract and, in each negotiated procurement, he and his assisting negotiators work directly with the contractor to formulate a contract which will provide the Government with the best possible contractual arrangement while, at the same time, paying the contractor a fair price for his services or materials.

The contracting officer is responsible for the negotiation of assigned procurements. The negotiation of contracts may involve such things as:

- **Overlapping or concurrent design, evaluation and production schedules.** Because of urgent requirements, it is frequently necessary to proceed with fabrication and evaluation of equipment without benefit of prior technical guidelines or concrete cost data. Overlapping costs, inherent in production of similar equipment adaptable to various concepts and configurations of installation, will require novel negotiating techniques in choosing the appropriate contract type and negotiating the pricing terms with the contractor.

- **Large dollar amounts.**

- **Long periods of time.** Design, development, fabrication, test, evaluation and modification of the equipment usually cover a period of three years or longer.

- **Complex equipments.** The equipment may require a series of contracts covering various phases of research and development from design and experimentation through development, service test, prototype and production stages. Overlapping of stages and changing requirements during all stages, as well as close interrelationships with other shipboard, airborne, or shore-based systems, make negotiation exceedingly difficult.

- **Concurrent and interrelated contracts.** Several contracts with different contractors are frequently related to design, development and fabrication of parts or equipment which are components of a complete weapon or weapon system. Changes in one contract frequently affect other contracts.

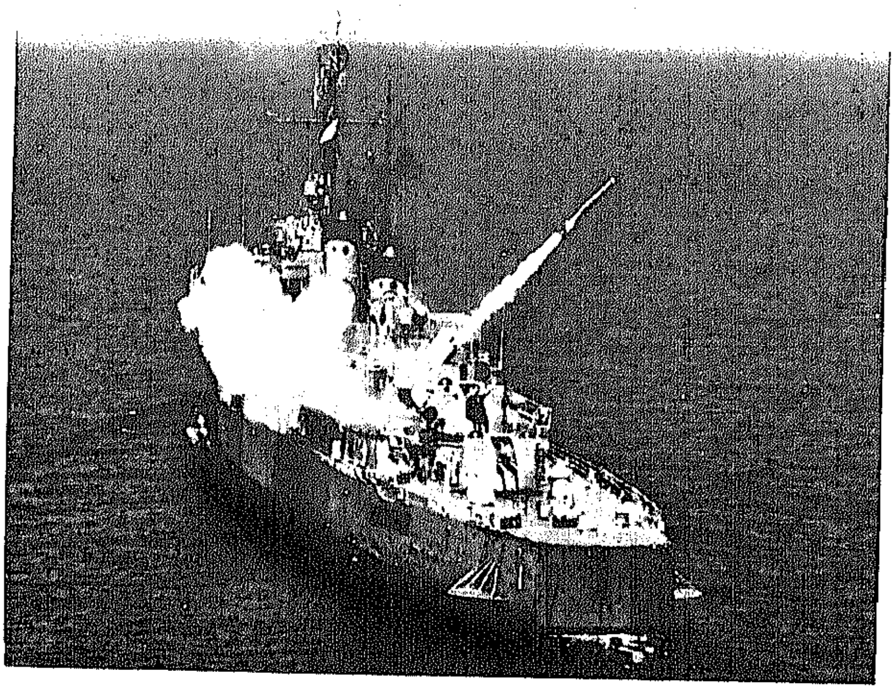
- **Complex procurements.** There are procurements for which a reasonably accurate price cannot be negotiated prior to performance of part of the work due to the unknown factors, or the lowest fixed price obtainable is not satisfactory to the negotiator. In such instances the contracting officer must decide upon the best type of contract for the situation. The selection of the proper type of contract is extremely important to prevent the Government from incurring excessive costs, and to maintain an incentive to the contractor to reduce costs.

The contracting officer conducts pre-negotiation conferences in order to avail himself of all points of view and information bearing on the negotiation. He may call upon any personnel in the command—engineering, legal, production, or other—and on cognizant field personnel, such as the auditor or inspector, for advice, information, or assistance. However, the contracting officer, personally, must determine the Government's position on the negotiation.

Because of the lack of meaningful cost and price information, the contracting officer may explore new and unusual avenues of approach in order to arrive at an equitable procurement. He must compare procurements made by other departments and agencies under the same or similar circumstances, making an analysis of the contract provisions and the policies and procedures behind them, and discussing them with top procurement personnel in the agencies involved and, in some cases, with the contractors.

The contracting officer conducts negotiations required to settle difficult problems which arise on existing contracts, *e.g.*, changes in scope of work or of the specifications, and negotiation of a government claim for price reductions and adjustments as a result of the failure of equipments to comply fully with warranties or guarantees.

Contract modifications changing the contractual requirements and approval of subcontracts are significant responsibilities of the contracting officer. It will be necessary, in many instances, to negotiate modifications for the procurement of end-item hardware which, because of critical delivery dates for long-lead-time items, is to be produced simultaneously with the design and development of engineering models for the same equipments. Numerous subcontracts are a common thing under this



Anti-submarine warfare combination ASROC with a torpedo Mark–46 payload is launched from the Destroyer USS Norfolk (DL–1).

and similar contractual documents. It is the negotiator's responsibility to assure that the contractor has a sound make-or-buy and subcontracting program, and that subcontracts are properly awarded and priced.

The contracting officer periodically visits the command field representatives and other DOD field representatives who participate in the administration of contracts under his cognizance. He reviews with the field representatives the procedures used in the administration of contracts and approval and surveillance of certain subcontracts. Information, guidance and advice are continually being exchanged by phone.

The contracting officer in headquarters is the procuring contracting officer. The field representative is the administrative contracting officer. Both contracting officers—procuring and administrative—work as a contracting officer team. The administrative contracting officer assures that contract terms established by the procurement contracting officer are effected, and provides the procurement contracting officer with detailed information to be used in negotiating both basic contracts and contract modifications.

The Small Business Program

As a principal procurement activity, the Office of Small Business in the Naval Ordnance Systems Command aids, assists and counsels small business concerns to encourage their participation in the procurement of supplies and services within their capabilities. The small business specialist acts as the focal point within the command for all inquiries and requests for advice from small business firms on procurement matters. The Small Business Office also admin-
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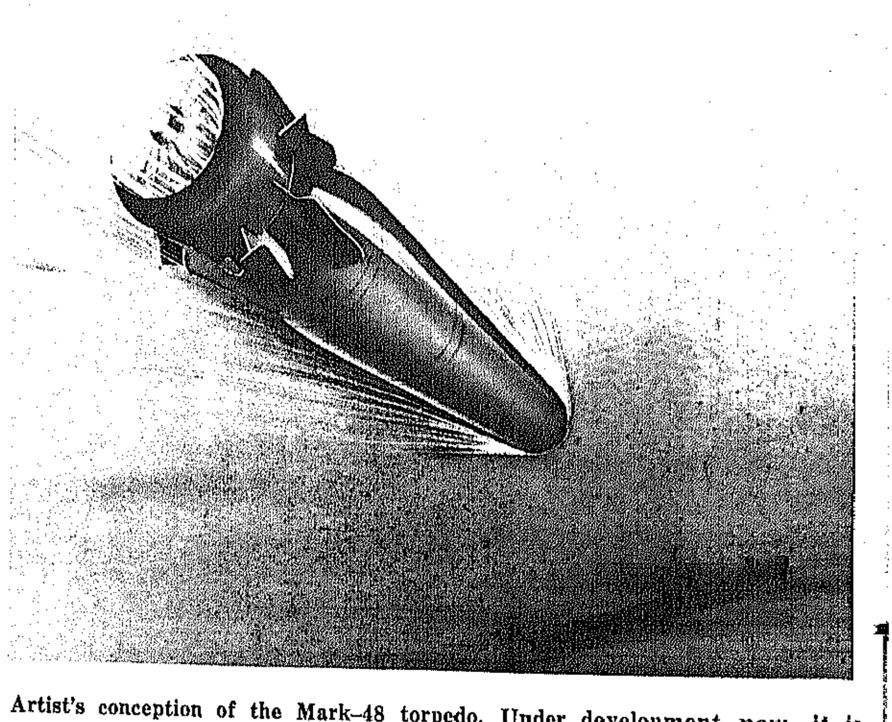
thereby, given adequate consideration to compete for procurement opportunities within their performance capabilities. Wherever possible, the command participates in procurement conferences or clinics which may include seminars, exhibits and other efforts designed to acquaint businessmen with procedures and requirements for development of additional sources. Procurement conferences may include presentations to better acquaint industry with the technical objectives of the command.

The complex nature of the naval weapons and weapon systems may limit the potential of small business concerns as prime contractors. Consequently, many small firms are referred to field activities under the support of the Naval Ordnance Systems Command engaged in research, development, production and procurement of ordnance supplies or services. In some instances, the potential of a small business concern may be better suited as a subcontractor under the DOD Small Business Subcontracting Program. The program, which is mandatory in prime contracts exceeding $500,000 offering substantial subcontracting possibilities, is conducted by leading prime contractors to the command. The adequacy of the program is periodically reviewed to insure that the potentialities of small business concerns as subcontractors are considered fairly.

Numerous representatives of industry are in daily personal contact with technical personnel of the command. These contacts serve many purposes ranging from the presentation of new ideas to solving problems in current production. In connection with new ideas, the command welcomes unsolicited proposals which it receives and processes in accordance with the Armed Services Procurement Regulation.

The Technical and Systems Engineering Office is the principal developer and advisor for ship weapon concept formulation, the engineering technologies essential to support hardware design, ordnance safety, and ordnance packaging and handling. Effective design, protection and operation of weapon systems can be accomplished only through continuous, freely given cooperation between the Navy and industry, and between organizations within industry and within the Navy. These reciprocal efforts are promoted, required and utilized in many ways.



Artist's conception of the Mark-48 torpedo. Under development now, it is designed to combat modern, high-speed submarines at long range.

Liaison with Industrial and Technical Associations

Industrial and technical associations, such as the Aerospace Industries Association (AIA), the National Security Industrial Association (NSIA), the American Ordnance Association (AOA), and many others form a sounding board for securing, in advance, information concerning the needs for, and anticipated effects of Navy policies, procedures and decisions. For example, the Naval Ordnance Systems Command maintains liaison memberships on most of the groups and sections of the AOA, contributing through preparation of technical papers and participation in technical meetings. Specifications and standards for hardware, such as fasteners, as well as engineering practices, such as the use of standard screw threads, are developed cooperatively with such groups as the AIA, National Aerospace Standards Committee, The U.S. Standards Institute (USASI), Society of Automotive Engineers (SAE), and others. More specifications, written by the Government for end-item equipments, are being coordinated with industry during the regular coordination cycle to develop realistic requirements concurrent with the latest state of the art. This Navy-industry cooperation has improved the overall quality and acceptability of our military specifications. Information obtained in this manner is valued, used and appreciated by the command.

The command participates actively in officially recognized programs for the exchange of information. The Interagency Data Exchange Program (IDEP), for example, is a free interchange of technical information and environmental test data on parts and components used in the design of weapon systems between 176 military-space contractors and 69 government agencies to provide economy in contract expenditures and reliability assurance. The objective of IDEP is to have the data waiting for the engineer rather than to have the engineer waiting for the data.

The Failure Rate Data (FARADA) Program is a Navy, Air Force, Army and NASA-sponsored effort to provide parts and components failure rate and failure mode data to 246 government activities and contractors designing military and space equipment. Within the Navy, this effort is administered by the Naval Ordnance Systems Command.

Contract Administration

Value engineering incentive clauses in Naval Ordnance Systems Command contracts are gaining the interest of its contractors. The Armed Service Procurement Regulation has established requirements for value engineering in contracts which can significantly enhance the contractor's profits. Twenty-eight value engineers in headquarters and in field organizations support the contractors in considering "overall minimum cost to perform the function," which is the basis of value engineering application. As the central contact points in their respective areas, these engineers are able to expedite the evaluation of value engineering changes and their actual incorporation into weapon systems.

To insure that the Naval Ordnance Systems Command receives quality products in the most economical manner, particularly where complex weapon systems are involved, Navy Plant Representative Offices (NAVPLANTREPOs) are established within the premises of the private contractors' plants responsible for the manufacture and the delivery of end items.

Within each NAVPLANTREPO is an organization with full capability in the Defense Contract Administration Services (DCAS) areas of engineering, quality assurance, industrial facilities, and business administration. A team concept is employed which is dedicated to assisting the contractor in any appropriate way to perform fully and adequately all facets of the contract. With the advent of the DOD single cognizance program, NAVPLANTREPOs have been given the full responsibility of administering all contracts for the Defense Department in the plants in which they are located, in reality becoming DOD representatives rather than a single Service representative. Currently Naval Ordnance Systems Command NAVPLANTREPOs are established in Azusa, Calif.; Mishawaka, Ind.; Pittsfield, Mass.; Pomona, Calif.; Sunnyvale, Calif.; and Silver Spring, Md.

Several of the command directorates (major subdivisions) are charged with the development and production of hardware in assigned areas of material cognizance.

In the procurement of development effort, liaison with elements of industry begins with the initiation of the associated technical development plan. This liaison is on an informal basis with technical personnel to exchange information on the feasibility of various technical approaches and the availability of technology to meet the requirements of the program; and with management personnel to encourage and develop interest in the program. Technical personnel make many contacts with representatives of industry to determine capabilities for the work at hand and to encourage the interest of those considered capable, in order to obtain maximum competition.

In each case where doubt exists as to the capability of a prospective contractor, Naval Ordnance personnel visit the contractors facility to ascertain the availability of those requirements such as organization, experience, stability, etc., which are essential to the program. The purposes of these contacts is to limit the competition for this type of procurement to those elements of industry considered fully capable of meeting all of the requirements of the program.

In the procurement of production effort, contacts between the acquisition directorates and contractors are frequent, as both headquarters and field personnel provide technical administration of the contracts.

Very often the development of new hardware involves a three-way team, Naval Ordnance, a Navy or private laboratory, and a manufacturing facility. In an occasional case, one plant may serve as both laboratory and manufacturing facility.

Another area in which the command and industry work together closely is in bidders' conferences. The cognizant procurement planning officer or the cognizant contracting officer in the Contracts Office arranges such a conference with the first step of a two-step formally advertised procurement, or in connection with a negotiated procurement. At the conference, the planning or contracting officer, assisted by command technical personnel, answers questions by prospective bidders to enable them to

submit effective bids, quotations, or proposals by learning more specifically of the command's requirements.

The Industrial Readiness Program

An active industrial readiness planning program is necessary to insure full wartime benefits from industry's vast production potential. The ability of industry to respond rapidly to increased demands is of vital importance to the nation's security. Accordingly, the mission of the Naval Ordnance Systems Command's Industrial Resources Division is to assure that adequate industrial resources are available to support the demands of the Fleet under peacetime and combat conditions. With this mission the industrial mobilization objective is to further develop, improve and maintain a critically selective, flexible industrial capacity responsive to limited and general war requirements.

Responsiveness is contingent upon the validity of industrial readiness planning with the contractor, and his ability to react to unforeseen production demands. This involves:

- Production planning with industry.
- Maintenance of stand-by facilities in ready condition.
- Maintenance of stand-by plant equipment.
- Priorities allocations and urgencies.
- Materials stockpiling.
- Industrial preparedness measures.

Planning with industry includes the development and continuous updating of a mobilization production capacity. Mobilization schedules mesh with a manufacturer's peacetime production of both military and essential ... use agreement from the Naval Ordnance Systems Command, and produced 105mm shells in less than two months. Without this base, serious production problems would have existed.

Since plant equipment is needed to support a mobilization capacity, it is also necessary to maintain previously used, but now idle, government-owned production equipment to meet military demands after M-Day. In addition, there are many active government-owned tools used by industry for heavy extrusion and press forging which can be readily converted to support wartime needs. Using criteria to assure amortization in three and one-half years, a continuing replacement and restoration program is in effect for production equipment. This modernization assures immediate cost savings, and at the same time increases readiness for the Naval Ordnance investment of $470 million.

Priorities and allocations are administered by the Industrial Resources Division under regulations issued by the Business and Defense Services Administration (BDSA) of the Department of Commerce. There are two separate but closely related functions: by use of priorities authority, the Defense Materials System (DMS) assures that materials, components and end items required for Fleet support are produced as scheduled; and through allocation of steel, copper, aluminum and nickel alloys, a system of control is in operation on a stand-by basis to permit expansion when an emergency situation develops. The Military Urgency List (MUL) contains relative urgency guidance on current procurement programs to resolve a conflict in demand for industrial resources among military programs.

The Office of Emergency Planning (OEP) develops projections of stock- ... ensure a state of readiness to meet both peacetime and mobilization needs. Industrial preparedness measures are initiated to preclude production bottlenecks. Resource studies, mass production techniques, and pilot production lines are continuously evaluated by Naval Ordnance engineers to resolve manufacturing problems before an emergency situation develops.

The Naval Ordnance mission then is to weld these various programs into a cohesive package in which each serves a clearly defined purpose, and in which each has an objective consistent with the overall philosophy of mobilization and management of the nation's industrial resources in the interest of national security.

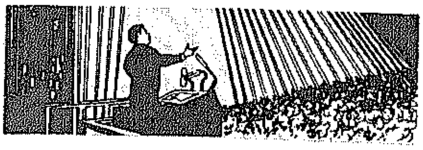
Naval Ordnance works with industry in countless ways. Beyond doubt Naval Ordnance and American industry are a going team, each complementing the other, and going forward to produce better and better services and supplies for the Fleet.

DASA Moves to New Headquarters

The Defense Atomic Support Agency (DASA) has moved its headquarters from the Pentagon to the Thomas Building, at the corner of North Court House Road and North 14th St., Arlington, Va.

DASA conducts the Defense Department's nuclear weapons programs. It is a direct descendant of the Manhattan Engineering District which developed the nation's first atomic bomb.

The new DASA address is: Department of Defense, Defense Atomic Support Agency, Washington, D.C. 20305.



FROM THE SPEAKERS ROSTRUM

Address by Hon. Paul R. Ignatius, Asst. Secretary of Defense (Installations & Logistics), at Annual Meeting of the National Aerospace Services Assn., Washington, D.C., May 2, 1967.

Hon. Paul R. Ignatius

Contracts for Technical Services

* * * * * * * * *

I would like to spend a few moments discussing a matter of current interest to you and to the Defense Department, namely, the respective roles of contractor and Government personnel in accomplishing certain needed services. Recently, both your association and the Department made formal statements to a Senate Committee on this subject. My purpose is not to examine the pros and cons of each item at issue, but rather to attempt to put the matter in proper perspective.

Late in 1964, DOD became concerned with certain contracts for technical services in which contractors' personnel were intermingled with government employees, received their orders and their work assignments directly from government supervisors, and were selected or discharged at the Government's option. The Civil Service Commission and the Comptroller General have issued formal opinions that these working conditions bring about an employer-employee relationship between the Government and the contract employees in violation of Civil Service laws and regulations, which specify other procedures and conditions for Federal employment. Secretary McNamara ordered a complete study of these contractual arrangements. The study disclosed some situations which appeared to involve irregularities discussed by the Civil Service Commission and the Comptroller General opinions, that the work involved could be performed at less cost by government employees, and that some of these contract positions should be converted to government employment in any event for reasons of military readiness. As a result of these findings, the Military Departments were requested to convert about 10,500 contracts positions to government employment and about half of these positions have, in fact, been converted. The remaining contract positions are being converted as quickly as possible.

Some of the companies affected by these decisions have offered several objections to the actions being taken. The validity of the opinions issued by the Civil Service Commission and the Comptroller General has been challenged. Fears are expressed that the conversion program really is not limited to 10,500 positions and that, in fact, the Government's long standing policy of relying on the private enterprise system is being abandoned. These companies also have questioned the basis for our conclusion that certain contract positions should be converted for reasons of military readiness. And, finally, our general conclusion that the Government can save money by converting these contracts to government employment has been challenged. . . .

Commercial Sources Needed for Products and Services

First, it seems hardly necessary to emphasize that neither the Defense Department nor the Government as a whole has abandoned the general policy of obtaining the products and services we need from commercial sources to the maximum extent consistent with effective and efficient accomplishment of our programs. For the past 13 years, that general policy has been expressed formally in guidelines issued by the Bureau of the Budget at the President's request. The most recent statement of the general policy is contained in Bureau of the Budget Circular No. A–76 which was issued about a year ago. The Defense Department participated in developing the circular. Let me give you several recent examples of our application of the general policy the circular establishes:

- Responsibility for operating the gas production plant at Portsmouth Naval Shipyard is being transferred from the Navy to a commercial firm.
- Responsibility for assembly of motors for the folding-fin aircraft rocket is being transferred from the Navy to a commercial electronics firm.
- Responsibility for production of parachute flares is being transferred from the Naval Ammunition Depot at Crane, Ind., to a commercial firm.
- Responsibility for maintaining and operating the administrative telephone system at McClellan AFB has been transferred from the Air Force to the telephone company which has the common carrier franchise in the area. Similar actions have been taken at about 70 radar sites throughout the country and at Norfolk, Va.; Charleston, S.C.; Pensacola, Fla.; and several other naval facilities.
- Government operation of the motor pool at Brooks AFB has been

discontinued and the needed services are being provided by a commercial firm.

There seems to be a belief among some groups that the Federal Government originally relied primarily upon the private enterprise system for all its requirements, but that the trend in recent years has been to rely more on government-owned and operated facilities. In fact, of course, the opposite has been the case. During the first hundred years of our nation's existence the Federal Government, and particularly the Military Departments, relied heavily upon government arsenals and other facilities of a similar nature. Only in fairly recent times have we learned to rely primarily upon private industry to provide the weapons, supplies, equipment and services we require. Many of the government arsenals and similar plants were established in the nineteenth century. Under Secretary McNamara's administration of the Department, there has been an intensive effort to get rid of installations we no longer need. Our list of base closures includes 66 industrial plants. Here are some examples:

- The Naval Ordnance Plants at York, Pa., and Macon, Ga., were sold to private companies in 1965.
- Three helium production plants at Moffett Field, Calif., at Lakehurst, N. J., and at Santa Ana, Calif., were closed in 1965 because our helium requirements could be provided commercially.
- Also in 1965 we announced closure of two ocean terminal facilities at Norfolk, Va., and at New Orleans, La., because the tonnage could be shipped via commercial facilities.
- The Army arsenal at Watertown, Mass., is to be closed next September and the arsenal at Springfield, Mass., is scheduled to be closed next March. The primary reason for ordering closures was that the artillery weapons, small arms, machine guns and mounts made in these plants could be provided by commercial sources.
- Similar actions have been taken at the Naval Fuel Annex at Richmond, Calif., at the Naval Fleet Annex in East Boston, Mass., and at the Army's St. Louis Ordnance Plant.

Clearly, it seems to me, the Department has indicated by actions as well as words that it fully supports the general policy of relying upon private enterprise for its needs.

Current Conversion Program not Expected To Change

I cannot assure you that conversions from contract to government employment will not be made in selected instances where the facts indicate that this is the wisest course of action. But I can tell you that our current conversion program is not expected to be changed.

Let us examine the current conversion program in more detail. It is limited to those contracts for technical personnel in which the Government retains responsibility for selection, suspension, assignment of work, and evaluation of performance of contract employees to such a degree that an employer-employee relationship is established between the Government and the employees. When these conditions are found to exist, they must be corrected by restructuring the contract (if that can be done economically) or by converting the positions involved to Federal employment. Such contracts have, in fact, been restructured in many instances.

There is one exception to this policy which applies to contracts for engineering and technical personnel. These contracts involve training, instruction and advice in the installation, operation and maintenance of weapons, equipment and systems used by DOD components. We have concluded that the Defense Department should have a direct capability to perform these functions as soon as the equipment becomes operational in the field or, if that is not feasible, within one year after it has become operational.

We have no reason to believe that the total number of converted positions will exceed the 10,500 in our current estimates. It should be clearly understood, however, that the General Accounting Office, as well as our own auditing and management analysis staffs, will be conducting cost comparison studies to determine whether we are acquiring the services we need in the most economical manner. In some instances, these studies may indicate that services being provided by contract should be provided directly by the Government. But our analyses have indicated that more frequently the result will be to transfer activities now being performed by the Government to commercial sources. In either event, these decisions will not be related to the opinions of the Civil Service Commission and the Comptroller General, or to the conversion program we have been discussing.

The statements which representatives of your association have made to the Senate Committee on Government Operations indicated that you question the legal validity of the recent opinions by the Civil Service Commission and the Comptroller General. DOD has made no comment on the legal issue. One reason for this is that we would be bound by the Comptroller General's decision even if we did not agree with it. In addition, the types of contractual arrangements which were termed illegal in these decisions appear to be undesirable also from the standpoint of good management.

The Federal Government and, I believe, most businesses find it necessary to have salary scales and personnel policies, which will assure that employees performing the same kinds of work under similar conditions are selected and paid according to the same general standards; and that they receive consistent treatment with respect to retirement, leave, promotion, hours of work, overtime, etc. One of the primary purposes of the Federal Civil Service system is to assure that the Federal Government has such a personnel system.

Where contract personnel and government employees are integrated into the same organizations, reporting to the same supervisors, and doing the same kinds of work, the effect is that two personnel systems must be applied to the same group of employees. Employees, who appear to deserve the same kind of treatment from the standpoint of the work they are doing, are treated quite inconsistently. In most instances their salaries are not the same. Promotions cannot be based on merit except within each of the two systems being applied. The Federal employees are bound by the Hatch Act and the conflict of interest laws, whereas the contract employees are not. The two classes of employees receive different per diem allowances when they travel on official business. In foreign countries, the

Federal employees must pay Federal income taxes, whereas contractors' employees are exempted from such taxes after they have served in a foreign location for more than 17 months. Usually there are also differences in retirement benefits, insurance and health protection, allowances for annual leave, etc.

When contract personnel and Federal employees are so completely integrated into a government organization that they cannot be readily distinguished with respect to their work and supervision, these differences in the treatment they receive may cause difficulties and unsatisfactory operating, administrative and morale conditions—entirely apart from any legal questions which may also be involved. In view of these problems of administration and management, we believe we would not be justified in seeking legislation to set aside the legal opinions of the Comptroller General and the Civil Service Commission—at least not until we have done everything possible to solve our problems within the ground rules provided in these opinions.

Cost Comparison Analysis

Now, I believe I should discuss the basis for our conclusion that the Government can save money by converting the kinds of contracts we have been discussing to Federal employment.

This conclusion was based upon a cost comparison analysis completed early in 1965 as a part of the study initiated by Secretary McNamara which I mentioned earlier. The scope of this project included not only contracts for technical services personnel but also covered the entire field of base support activities, including many of the types performed by members of your association. One of the principal conclusions from this study was that a substantial variety of the base support activities, involving expenditures of about $430 million per year, which were being performed by the Government directly, could be performed by contractors at less cost to the Government. As a result, some of these services have been assigned to contractors and additional cost comparisons are expected to lead to reliance upon contractors.

These findings pertaining to base support activities were in sharp contrast to those pertaining to contracts for technical personnel. The study indicated that it was costing the Government about $119 million for 7,069 contract service personnel, and that the work could be performed by the Government directly for about $100 million.

One of the main reasons for the differences in estimated costs was that experience in the Army, and in a few other agencies, had demonstrated that a smaller total staff was needed after a mixed organization of contractor and government personnel was converted to Federal employment. For example, the Army had converted 889 contract positions to government employment from 1962 to 1965 and required 600 Federal employees for the work—an overall reduction of 289 employees. Similar results have been revealed in subsequent studies, such as one recently completed by the General Accounting Office involving the conversion of a contract at White Sands Missile Range in New Mexico.

I believe it is significant that the study revealed opportunities for worthwhile savings by relying upon contractors for base support services, whereas the same study, conducted by the same analysts, indicated that savings also could be achieved by converting certain technical service contracts to government employment. Why the seeming contradiction?

The answer, I believe, is that there are fundamental differences between these kinds of contracts. Most contracts for base support services provide that the contractor assumes the responsibility for managing his staff and equipment with enough efficiency to provide the required services and make a profit. The Government is relieved of the responsibility for managing the operation and may, in some instances, also be relieved of certain risks and costs, such as equipment losses, obsolescence and additional capital investments.

Contracts for technical personnel do not enjoy these advantages. The contractor furnishes only manpower and the Government continues to bear the responsibility for managing the operation and the risks and costs of obsolescence, equipment losses, etc. The Government also bears the additional responsibility for administering a contract, while the contractor has little opportunity or incentive to use his experience and ingenuity to reduce costs and improve efficiency.

I believe there are two lessons to be learned from this comparison. One is that a contract to furnish only a specified number of people is not likely to be very desirable from the standpoint of cost and efficiency. Another is that it is in our mutual interest to avoid this type of contract and to include the features of a typical base support service contract whenever feasible.

In summary, I hope I have made it clear that:

- DOD is fully supporting the government policy to place reliance upon private business for commercial and industrial products and services.
- The program to convert some technical service contracts is a special case that is necessary for a number of reasons and limited in scope.
- Cost comparisons will continue to be made of our industrial and commercial needs to determine whether they can be met most efficiently by government or contractor performance. These comparisons will undoubtedly results in shifts from government to contract performance, but the reverse may also be true in some instances.

Three Navy Labs Transferred to Naval Air Development Center

The Naval Air Development Center (NADC), Johnsville, Pa., assumed administrative control over three additional Navy laboratories on July 1. The laboratories affected are: the Aeronautical Materials Laboratory, the Aeronautical Structures Laboratory, and the Air Crew Equipment Laboratory; all were assigned to the Naval Air Engineering Center, Philadelphia, Pa.

The transfer of these laboratories to NADC is part of an overall Navy program of realignment of research, development, test and evaluation functions, and will enable the center to carry out its assigned mission in aerospace systems and aviation medicine more effectively.

The three laboratories will be redesignated as departments under the direct administrative and technical control of NADC. Their functions will not change.

Progress in SAIMS Subsystem Development

Colonel Herbert Waldman, USAF

Since September 1965 the staff of the Assistant Secretary of Defense (Comptroller) has been engaged in the design and development of improved information systems for use in the management of large weapon/support systems acquisitions. The Cost Information Reports (CIR) subsystem was the first to evolve as a direct result of these efforts. It was developed from the Cost and Economic Information System (CEIS) which had been formally conceptualized in July 1964. Other subsystems and techniques followed in 1966, generally serving to mark the path of evolutionary development of uniform procedures for the collection of information needed in DOD management. As new subsystems have been initiated they have replaced, as planned, procedures designed in the past which were not sufficiently effective to merit their continued use.

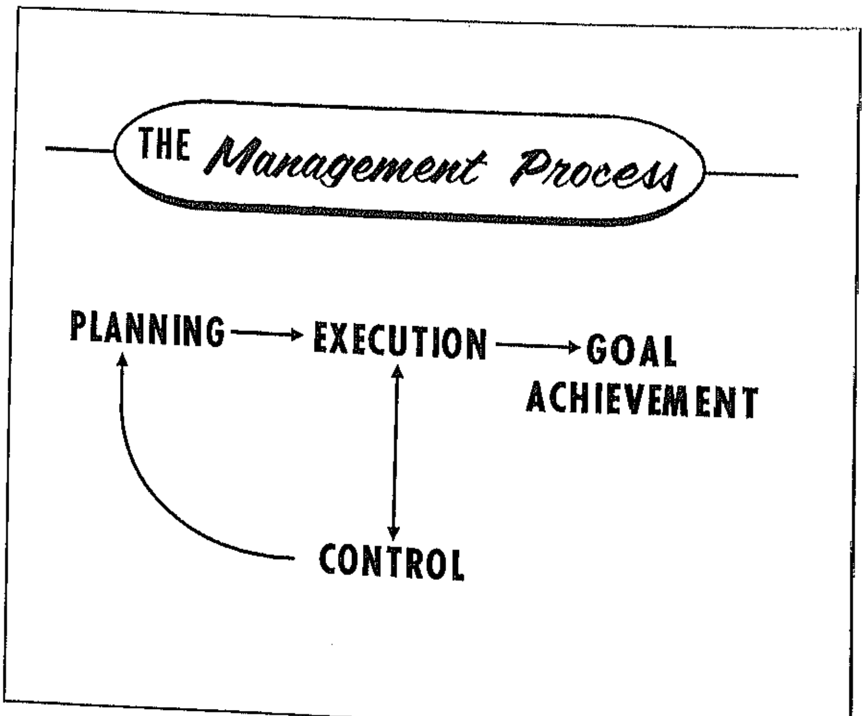
This is the nature of a continuing process in which an information subsystem is being developed for use to measure the progress of contractors' performance. The measurement process is oriented to provide the information which will support the capability to predict credible estimates of systems cost at completion, an area in which there have been marked deficiencies in past performance. This condition has persisted in spite of the fact that more attention is being given to work definition, and procedures have been specifically designed by each project manager to deal with this problem. The current effort to design an improved system, to be uniformly applied for this purpose, represents an evolutionary development of similar procedures generally in use by the Army, Navy and Air Force.

When a uniform system is installed throughout the Defense Department, each Military Department and Defense Agency will employ the same procedures under the Selected Acquisitions Information and Management System (SAIMS). The close relationship of the components of SAIMS to techniques and procedures now being utilized will also be of value in making possible a smoother transition in use, than would be the case if entirely new procedural content had been developed.

The central feature of SAIMS is the approach of using management control systems, developed by contractors, to produce the information DOD managers need to evaluate performance by measuring costs, and schedule and technical achievements in relation to plan. Such an evaluation will expose areas requiring explicit management attention. This effort, which is independent of Contractor Performance Evaluation (CPE), is concerned with acquiring information to better predict estimates at completion, on the basis of historical records of progress in performing the same contract to which those estimates are related. CPE is concerned with acquiring information to assess the credibility of a contractor's estimates (or proposals) on the basis of his achievement on prior contracts.

In performance measurement, the design efforts of the staff in the Office of the Secretary of Defense, which have been in process since 1965, resulted in the issuance of the draft of a requirements "package." This draft is now being circulated within defense industry, through the Council of Defense and Space Industries Association, for review prior to its adoption for DOD-wide use.

The key feature in the package is the statement of a set of criteria



for determining the acceptability of a contractor's system for controlling the accomplishment of the cost, schedule and technical requirements of the contract. As described, the criteria for Contractors' Cost/Schedule Control Systems include requirements for the following:

- Definition, description and grouping of all the work to be accomplished which is a source of contract cost.
- Assignment and identification of responsibility for work which generates contract costs.
- Planning and scheduling of work to be accomplished and changes made in plans and schedules.
- Establishing budgets for all activities which generate contract costs.
- Issuing work and resource authorizations and accounting instructions to performing activities.
- Accounting for costs of resource consumption in completed work, work-in-process, and for costs charged to overhead pools.
- Identifying what costs are planned to be, comparing them with actual costs, and explaining cost, schedule and technical variances including variances in forecasts and overhead data.
- Developing forecasts of costs at completion and fund requirements.
- Replanning, as necessary.
- Reporting management information to DOD managers from the same system that furnishes data internally.

In view of the fact that the contracts, which will be selected to be monitored using Contractors' Control Systems, involve considerable government cost-risk, some expenditure of resources to provide effective cost schedule control is justified by the potential for benefits to be derived from their operation.

To support the process of defining the work to be done in completing defense contracts and monitoring progress in accomplishing that work, the staff of the Office of the Secretary of Defense has also been developing uniform procedures for configuration management and work breakdown structure identification. The concept of a single work breakdown structure, when embodied in a contract, makes the flow of integrated information for management a practical possibility.

A work breakdown structure is the organized array which describes the components of a contract. The upper levels identify the various components or contract line-items to be furnished by the contractor. DOD managers provide the contractor with information when he begins the work which identifies the technical requirements of the components that the contractor is to produce. This portion of the work breakdown structure, with which contractors are constrained, is then extended based on the contractors' engineering in a desired way. The result indicates the products and organizations which are employed by the contractor to satisfy his contract obligations.

This approach, using a single work breakdown structure and the contractors' accounting system, can be used to satisfy the various data requirements of SAIMS in meaningful fashion. The complete work breakdown structure indicates the relationship of the elements in the structure, which are specified by the Government, to the elements developed by the contractor. It also depicts the way in which data are accumulated from a single framework to meet various needs for information, including those of the contractor and of military managers. Figure 1 indicates in oversimplified fashion the relationship of the parts of a work breakdown structure to each other and some of the associated requirements for information. The information, which the Government obtains from the contractors' use of this framework, can satisfy the requirements for cost data, or for an identification of the hardware components that are aggregated to produce the end items called for in the contract. Although the aggregations represented in configuration or cost data arrays may differ, they represent data relationships only. They will be compatible at the upper levels with that single array called the work breakdown structure, which describes the interrelationship of the working elements of the contractors organization responsible for producing the products of the contract.

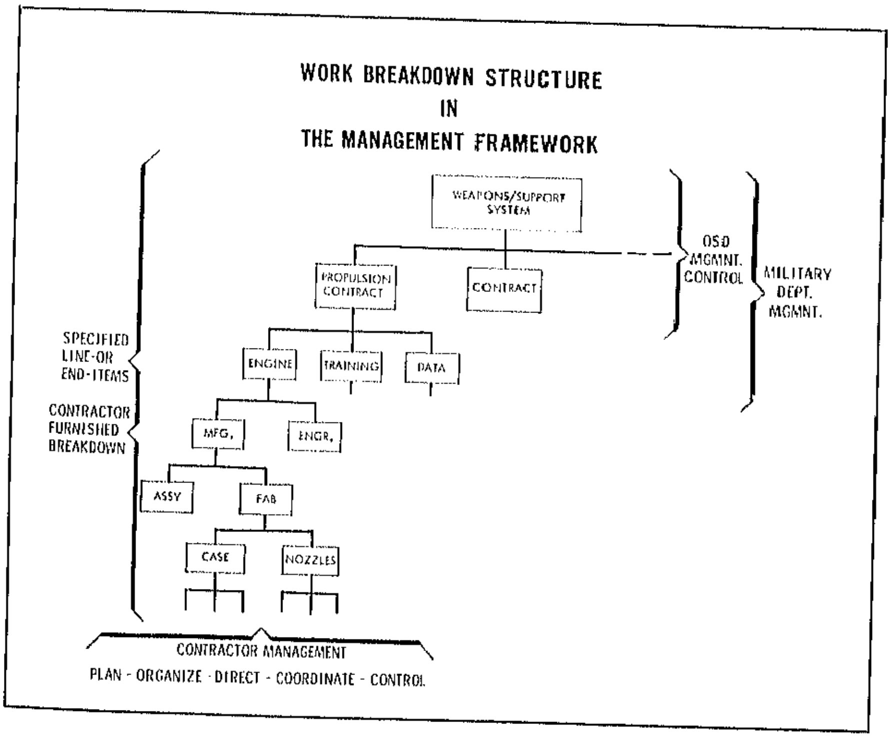


Figure 1.

In the difficult task of identifying "significant" areas of application and "reasonable" measures to meet requirements, a glossary of terms has been developed. (The contents of the glossary are published at the end of this article.) Through its use it thus becomes possible to discriminate between semantic and substantive problems, and to work out necessary clarification of the description of

control system requirements into the elements, *i.e.*, criteria or glossary, which are most directly associated with the source of the problems of understanding. Standard terminology, used at all levels of implementation, will be most helpful in resolving procedural questions which will inevitably arise.

As we seek to improve the information for management use, we must not lose sight of the fact that these requirements for improved management control are only a means to the desired end—the completion of DOD's contractual agreements with the greatest success and efficiency. Management control is only one aspect of the overall process we must accomplish in achieving that goal.

Glossary

Accrual Basis. The method of accounting whereby resources are charged as the cost of a given product (hardware, test, study, etc.) when they are consumed or applied to the product without regard to the date of payment or the date of acquisition.

Budgeted Costs. An estimate of future cost used to plan the use of manpower, material and other resources and provide a control over future operations. At any given time, the contractor may have authorized the consumption of resources above or below the Budgeted Costs in order to accomplish the required contract objectives. Such authorizations, although not based on contractual direction, may be referred to as "budgets" by the contractor, and in such instances must be reconcilable to Budgeted Costs.

Change Control. That element of a contractor's internal system whereby the impact of Contract Change Notices (CCN) and Supplemental Agreements (SA) can be traced, in terms of work content, measures of output, and resources budgeted, into the basic contractual effort. It is recognized that, although traceable, CCNs and SAs may lose their identity once incorporated into the basic work effort.

Contract Target Cost. The sum of all definitized costs authorized by the DOD contracting component.

Contract Target Cost Equivalent. The sum of all definitized costs and estimated costs for authorized work not yet definitized.

Cost Control Account. An identified level, within the work breakdown structure and organization structure, at which costs are collected in order to compare planned and actual direct labor costs, material costs and other costs for management control purposes. Within the scope of these criteria, it is also the level at which the contractor must be capable of comparing the planned costs of work accomplished with actual costs for purposes of specific variance analysis.

Cost Incurred. Costs charged to a cost control account on an accrual basis (see Accrual Basis).

Direct Costs. Any item of cost (or the aggregate thereof) which may be identified specifically with any objective, such as a product, service, program, function, or project; usually, but not necessarily, limited to items of material and labor. The distinction between direct and indirect costs is often arbitrary, or is based upon convenience and cost accounting simplicity without sacrifice of reasonable accuracy in overall costs of specific objectives.

Indirect Costs. An item of cost (or the aggregate thereof) which is incurred for joint objectives and, therefore, cannot be identified specifically with a single final objective, with respect to the end-products, services, program, or project. A cost may be direct with respect to some specific service or function, the total cost of which is in itself indirect with respect to the end-products, services, programs, or projects. An indirect cost is usually allocated to the several cost objectives. More commonly referred to as overhead costs, burdens and/or general and administrative costs with the burden being apportioned over all products and services by an approved technique.

Colonel Herbert Waldman, USAF, is Director for Assets Management Systems in the Office of the Assistant Secretary of Defense (Comptroller). He holds a master's degree in business administration from the University of Michigan as well as a masters degree in international affairs from George Washington University.

Objective Indicators. Meaningful, auditable, discrete events which, by their occurrence, clearly signify to third parties the start, intermediate degree of accomplishment, and completion of a work package.

Overhead Work. Work that is not directly associated with products or work packages. Includes work of which only a portion is required to meet the contract obligations.

Overhead Units. Units that perform overhead work. Includes manufacturing activities which may not incur direct material and direct labor costs. (See Indirect Costs.)

Planned Cost. The allocation of total contract target cost to specified work derived from budgeted costs and budget reserves established by the contractor. When properly integrated the planned application of resources to accomplish specified work can serve as a meaningful basis for cost and schedule performance measurement and control.

Planned Cost of Work Accomplished. The sum of the Planned Cost of completed work plus a reasonable allocation of the Planned Cost of work-in-process based on criteria approved by the contracting DOD component.

Work Breakdown Structure (WBS). A product-oriented family tree division of hardware, software, services and other work tasks which organizes, defines and graphically displays the product to be produced, as well as the work to be accomplished in order to achieve the specified product. This forms a common, manageable framework against which to schedule, apply resources, establish planned costs, and measure progress.

Work-in-process. Work packages which have been reported as started

(*Continued on inside back cover*)

ABOUT PEOPLE

DEPARTMENT OF DEFENSE

Paul C. Warnke has been appointed Asst. Secretary of Defense (International Security Affairs) succeeding John T. McNaughton. Mr. Warnke was formerly General Counsel of the Defense Department.

Dr. Gardiner L. Tucker has been appointed Dep. Dir. (Electronics and Information Systems) in the Office of the Dir., Defense Research and Engineering.

Dr. Peter Franken, who has been serving as Dep. Dir. of the Advanced Research Projects Agency since January, has been appointed Acting Dir. of the agency succeeding Dr. Charles M. Herzfeld.

Maj. Gen. Richard P. Klocko, USAF, has been named Dep. Dir., National Military Command Technical Support, Defense Communications Agency.

Maj. Gen. Ethan A. Chapman, USA, has taken over the post of Chief of Staff at Headquarters, North American Air Defense Command, Colorado Springs, Colo., succeeding Maj. Gen. Mervyn M. Magee, USA, who has retired.

Paul H. Nitze is the new Deputy Secretary of Defense succeeding Cyrus R. Vance, who resigned effective June 30, 1967. Mr. Nitze served as Secretary of the Navy from November 1963 and prior to that was Assistant Secretary of Defense (International Security Affairs).

Maj. Gen. Woodrow W. Vaughan, USA, has been designated Dep. Dir., Defense Supply Agency.

Brig. Gen. Robert J. Meyer, USAF, has been designated Dir., Aircraft and Missiles, Office of Dep. Asst. Secretary of Defense (Materiel), Office of Asst. Secretary of Defense (Installations and Logistics).

Brig. Gen. Robert C. Richardson III, USAF, Dep. Commander, Field Command (Weapons and Training), Defense Atomic Support Agency, Sandia Base, N.M., retired Aug. 1.

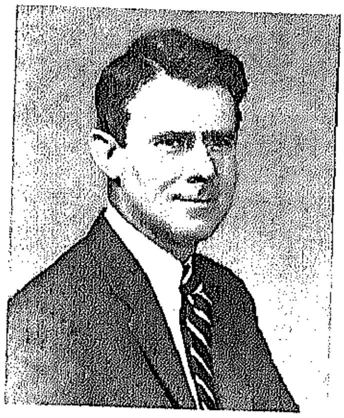
Don R. Brazier has been designated Comptroller of the Defense Supply Agency. He succeeds **Dr. Wilfred J. Garvin,** who has moved to a new position with the Small Business Administration.

Col. James T. Herbst, USAF, has been appointed Dep. Dir. of Freight Traffic, Military Traffic Management and Terminal Service, Washington, D.C.

Col. James T. Johnson, USAF, has been named Dep. Dir., Materiel & Services, Defense Communications Agency Planning Group.

DEPARTMENT OF THE ARMY

Gen. Ralph E. Haines Jr., was sworn in as Army Vice Chief of Staff and concurrently promoted to four-st rank in Pentagon ceremonies June



Cyrus R. Vance resigned from the position of Deputy Secretary of Defense on June 30, 1967. In six and one-half years of service with the Defense Department, he was General Counsel and then Secretary of the Army before he became Deputy Secretary Defense in January 1964.

Lt. Gen. Harry W. O. Kinnard a sumed command of the U. S. Arm Combat Developments Command o July 1. He succeeds Lt. Gen. Ben Ha rell who was reassigned as Com mander, Sixth U. S. Army.

Lt. Gen. James K. Woolnough ha succeeded **Gen. Paul L. Freeman** a Commanding General, U. S. Conti nental Army Command.

Maj. Gen. Charles W. Eifler ha been appointed Commanding Gen eral, Army Missile Command suc ceeding **Maj. Gen. John G. Zierdt**

Brig. Gen. James F. Hollingsworth has assumed duties as Dep. Commanding General, Army Test and Evaluation Command, Aberdeen Proving Ground, Md. He succeeds Col. John F. Polk.

William B. Taylor has been appointed Scientific Adviser, Missiles and Space Directorate, Office of the Chief of Research and Development, Department of the Army.

Three commodity managers have been appointed by Army Weapons Command. They are: **Frank X. Connolly,** Automatic Data Systems within the Army in the field; **George N. Burdick,** M102 howitzer system; and **Lowell B. McClain,** Commando V100, four-wheel drive, armored car.

Col. Robert B. Bennet has been assigned as Commander, U. S. Army Research and Development Group (Europe).

The Army Missile Command has assigned **Col. John G. Redmon** as Project Manager for the Hawk Missile System.

Col. John B. Stockton is the new Dir., Armor Materiel Testing, Army Test and Evaluation Command, Aberdeen Proving Ground, Md.

Lt. Col. Eugene W. Dow has succeeded **Lt. Col. John W. Elliott** as Commander, Army Aviation Materiel Laboratories, Fort Eustis, Va.

Lt. Col. John W. Walker is the new Commander, Rocky Mountain Arsenal, Denver, Colo. He relieved **Lt. Col. Martin J. Burke Jr.**

DEPARTMENT OF THE NAVY

Lt. Gen. Leonard F. Chapman Jr., has been appointed to the post of Asst. Commandant of the Marine Corps. He replaces Lt. Gen. Richard C. Mangrum, who is retiring from the service.

Other assignments announced by the Marine Corps include: Lt. Gen. Lewis W. Walt, Dir. of Personnel and Dep. Chief of Staff for Manpower; Maj. Gen. Richard G. Weede, Commanding General, Fleet Marine Force, Atlantic; Lt. Gen. Henry W. Buse Jr., Chief of Staff, Headquarters, Marine Corps, replacing Gen. Chapman; and Maj. Gen. Ralph K. Rottet, Dep. Chief of Staff (Plans and Programs) succeeding Gen. Buse.

RAdm. Herschel J. Goldberg, (SC), Commander, Naval Supply Systems Command and Chief of the Navy Supply Corps, retired Aug. 1. His successor is RAdm. Bernhard H. Bieri Jr. (SC).

Capt. A. H. Clancy Jr., Commanding Officer, Naval Air Engineering Center, Philadelphia, Pa., and Capt. Paul F. Cosgrove Jr., Commanding Officer, Navy Fleet Material Support Office, Mechanicsburg, Pa., have been selected for promotion to the rank of rear admiral.

Capt. Clyde E. Fulton, (SC), has succeeded Capt. Edward K. Scofield, (SC), as Commanding Officer, Naval Supply Depot, Mechanicsburg, Pa.

DEPARTMENT OF THE AIR FORCE

Listed for retirement are Lt. Gen. Herbert B. Thatcher, Commander, Air Defense Command, and Lt. Gen. Charles B. Westover, Vice Commander Air Defense Command. Gen. Thatcher will be succeeded by Lt. Gen. Arthur C. Agan Jr. The new vice commander, replacing Gen. Westover, is Maj. Gen. James C. Jensen.

Lt. Gen. James W. Wilson has been appointed Vice Commander, Military Airlift Command, Scott AFB, Ill.

Brig. Gen. William C. Garland has relieved Maj. Gen. E. B. LeBailly as Dir. of Information, Office of the Secretary of the Air Force. Brig. Gen. James F. Hackler Jr., former Asst. Dep. Chief of Staff, Operations, U.S. Air Force, Europe, has been named Dep. Dir. of Information.

Brig. Gen. William B. Martensen has been reassigned as Commander, Strategic Aerospace Div., Strategic Air Command, from duty as Asst. Dep. Chief of Staff (Operations), SAC Headquarters, Offutt AFB, Neb.

Brig. Gen. Robert W. Paulson has been named Commander, Air Force Communications Service, Scott AFB, Ill.

Assignments at Headquarters, U. S. Air Force, include: Maj. Gen. Gerald F. Keeling, Asst. Dep. Chief of Staff (Systems and Logistics); Maj. Gen. George B. Simler, Dir., Operations, Office of the Dep. Chief of Staff (Plans and Operations); Brig. Gen. Sam J. Byerley, Dep. Dir., Operations, Office of Dep. Chief of Staff (Plans and Operations); Brig. Gen Leo A. Kiley, Dir., Science and Technology, Office of the Dep. Chief of Staff (Research and Development); Brig. Gen. James O. Lindberg, Dir., Procurement Policy, Office of the Dep. Chief of Staff (Systems and Logistics); and Brig. Gen. Andrew S. Low Jr., Asst. for Logistics Planning, Office of the Dep. Chief of Staff (Systems and Logistics); Col. John L. Frisbee, Special Asst. to the Vice Chief of Staff.

Col. Herbert L. Wurth has been assigned Chief, Public Information Div., Office of Information, Office of the Secretary of the Air Force.

Assignments at Air Force Systems Command (AFSC) include:

Maj. Gen. John L. Zoeckler, F-111 Program Dir. for the past four years, is reassigned as Dep. Chief of Staff (Systems), AFSC Headquarters; Brig. Gen. Lee V. Gossick, now serving as Commander, Arnold Engineering Development Center, Tenn., succeeds Gen. Zoeckler on or about Sept. 1; Gen. Gossick will be succeeded by Brig. Gen. Gustav E. Lundquist, who is now assigned as Dep. for Engineering, Aeronautical Systems Div.

Other AFSC assignments are: Maj. Gen. John B. Bestic, Commander, Electronic Systems Div.; Maj. Gen. Harry E. Goldsworthy, Commander Aeronautical Systems Div.; Brig. Gen. William S. Chairsell, Dep. Chief of Staff (Systems), AFSC Headquarters; Brig. Gen. Fred J. Higgins, Dep. Chief of Staff (Procurement and Production), AFSC Headquarters; Brig. Gen. Clifford J. Kronauer Jr., Commander, Air Force Western Test Range; Brig. Gen. David V. Miller, Commander, Air Force Special Weapons Center, Kirtland AFB, N.M.; Brig. Gen. Kenneth W. Schultz, Dep. for Minuteman, Space and Missil Systems Organization.

The following colonels have bee assigned to indicated AFSC posts Col. Lionel C. Allard Jr., System Program Dir. for 496L/474L, Electronics Systems Div.; Col. George T Buck, Commander, Air Force Missil Development Center, Holloman AFB N.M.; Col. James L. Dick, Dir., Air Force Avionics Laboratory, Research and Technology Div.; Col. Raymond A. Gilbert, Dir., Laboratories, AFSC Headquarters; Col. Franklin J. Hickman Sr., Asst. Systems Program Dir., Long Line Communications, Electronics Systems Div.; Col. David R. Jones, Dir., Air Force Weapons Laboratory, Kirtland AFB, N.M.; Col. William R. Morton, Vice Commander, Air Force Special Weapons Center, Kirtland AFB, N.M.; Col. Theodore E. Mock, Dir., (Research and Technology), Dep. for Technology, Space Systems Div.; and Col. Fred A. Shirley, Systems Program Dir., RC-135 Aircraft, Aeronautical Systems Div.

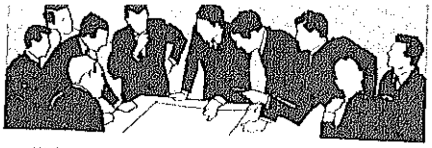
Assignments at Air Force Logistics Command include: Maj. Gen. Fred J. Ascani, Dir. of Operations, AFLC Headquarters, Wright-Patterson AFB, Ohio; Brig. Gen. Arthur W. Cruikshank Jr., Dep. Commander, Warner Robins Air Materiel Area, Robins AFB, Ga.; Col. Selwyn J. Barefoot, Dir., Procurement and Production, Ogden Air Materiel Area, Hill AFB, Utah; and Col. Harvey H. Latson Jr., Dep. Civil Engineer, AFLC Headquarters.

Space and Missile Systems Organization Formed within AFSC

The Air Force Systems Command's Ballistic Systems Division at Norton AFB, Calif., and the Space Systems Division at Los Angeles AFS, Calif., were realigned on July 1, 1967, to form a new Space and Missile Systems Organization (SAMSO). The headquarters of the new organization is at Los Angeles Air Force Station, Air Force Unit Post Office, Los Angeles, Calif. 90045.

Most of the mission functions remain in their present locations at Norton AFB and Los Angeles AFS.

Major General John W. O'Neill, formerly commander of the AFSC Electronic Systems Division, is the commander of the new organization with duty station at Los Angeles AFS.



MEETINGS AND SYMPOSIA

AUGUST

Electroslag Consumable Electrode Remelting Technology Conference, Aug. 9–10, at Mellon Institute, Pittsburgh, Pa. Co-Sponsors: Mellon Institute and the Air Force Materials Laboratory, Wright-Patterson AFB, Ohio. Contact: Air Force Materials Laboratory, Wright-Patterson AFB, Ohio 45433.

FALL

1967 Conference on Speech Processing, dates undetermined, at Boston, Mass. Co-sponsors: Institute of Electrical and Electronics Engineers and the Air Force Cambridge Research Laboratories. Contact: C. P. Smith, (CRBS), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01731, phone (617) 274–6100, Ext. 3712.

SEPTEMBER

Second Symposium on Automatic Control in Space, Sept. 4–8, at Vienna, Austria. Sponsor: International Federation of Automatic Control. Contact: J. A. Aseltine, TRW Systems, Space Park Drive, Houston, Tex. 77058.

International Symposium on Information Theory, Sept. 11–15, at Athens, Greece. Sponsors: Air Force Office of Scientific Research, Information Theory Group of the Institute of Electrical and Electronics Engineers and the International Radio Scientific Union. Contact: Lt. Col. B. R. Agins, (SRMA), Air Force Office of Scientific Research, 1400 Wilson Blvd., Arlington, Va. 22209, phone (202) OXford 4–5261.

International Symposium on Materials—Key to Effective Use of the Sea, Sept. 12–14, at the Statler Hilton Hotel, New York, N.Y. Co-sponsors: Naval Applied Science Laboratory and the Polytechnic Institute of Brooklyn, N.Y. Contact: D. H. Kallas, Associate Technical Director, Naval Applied Science Laboratory, Flushing and Washington Avenues, Brooklyn, N.Y. 11251.

Advanced Composite Structures Symposium, Sept. 19–21, at Hilton Hotel, Denver, Colo. Sponsor: Air Force Materials Laboratory. Contact: Mr. Tomashot, (MAC), Air Force Materials Laboratory, Wright-Patterson AFB, Ohio 45433, phone (513) 253–7111, Ext. 55317.

Eighth Symposium on Physics and Nondestructive Testing, Sept. 19–21, at Dayton, Ohio. Sponsor: Air Force Materials Laboratory, Wright-Patterson AFB, Ohio 45433.

Joint Power Generation Conference, Sept. 24–28, at the Statler Hilton Hotel, Detroit, Mich. Co-sponsors: Institute of Electrical and Electronics Engineers and the American Society of Mechanical Engineers. Contact: Carl Shabtach, General Electric Co., Schenectady, N.Y.

Seventh Annual National Conference on Environmental Effects on Aircraft and Propulsion Systems, Sept. 25–27, at Nassau Inn, Princeton, N.J. Contact: Robert A. Reale, Program Vice-Chairman, U.S. Naval Air Turbine Test Station, P.O. Box 1716, 1440 Parkway Ave., Trenton, N.J. 08628, phone (609) 882–1414, Ext. 224.

Fourth International Conference on Atmospheric and Space Electricity, Sept. 29–Oct. 6, at Lucerne, Switzerland. Sponsors: Air Force Cambridge Research Laboratories, Army, Navy, National Science Foundation and National Aeronautics and Space Administration. Contact: M. B. Gilbert, (CRTE), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01731, phone (617) 274–6100, Ext. 3633.

OCTOBER

Twenty-second annual Transportation and Logistics Forum, Oct. 3–6, at the Biltmore Hotel, Los Angeles, Calif. Sponsor: National Defense Transportation Association. Contact: Les Richards, 3416 S. La Cienega Blvd., Los Angeles, Calif. 90016.

Conference on Reinforced Metal Matrix Composites, Oct. 10–12, at Wright-Patterson AFB, Ohio. Co-Sponsors: Air Force Materials Laboratory and the University of Dayton.

Eleventh Annual Organic Chemistry Conference, Oct. 12–13, at Natick, Mass. Sponsors: National Academy of Science-National Research Council, Advisory Board on Military Personnel Supplies, and Organic Chemistry Laboratory, Pioneering Research Div., Army Natick Laboratories. Contact: Dr. L. Long Jr., Head, Organic Chemistry Lab., (PRD), Army Natick Laboratories, Natick, Mass. 01760, phone (617) 653–1000, Ext. 414.

Conference on the Exploding Wire Phenomenon, Oct. 18–20, at Boston, Mass. Sponsor: Air Force Cambridge Research Laboratories. Contact: W. G. Chace, (CRFA), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01730, phone (617) 274–6100, Ext. 4926.

Mass Transport in Oxides, Oct. 22–25, at the National Bureau of Standards, Gaithersburg, Md. Sponsor: Advanced Research Projects Agency. Contact: Dr. John B. Wachtman, Inorganic Materials Div., National Bureau of Standards, Washington, D.C. 20234, phone (301) 921–2901.

Conference on Unguided Rocket Ballistics Meteorology, Oct. 30–Nov. 1, at New Mexico State University, Las Cruces, N.M. Sponsor: Army Electronics Command. Contact: B. E. Britain, Atmospheric Sciences Office, Atmospheric Sciences Laboratory, White Sands, N.M. 88002, phone (505) 338–1006.

NOVEMBER

1967 Conference on Speech Communication and Processing, Nov. 6–8, at Boston, Mass. Co-sponsors: Air Force Cambridge Research Laboratories and the Institute of Electrical and Electronics Engineers. Contact: C. P. Smith, (CRBS), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01730, phone (617) 274–6100, Ext. 3712.

U.S.ARMY

WASHIN

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August 1967

MATERIEL COMMAND

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APRIL 1967

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LTG W.B. BUNKER OX 59006
DR. J. T. THOMAS OX 53596
VACANT
COL. J. B. CLARK OX 59574
COL. E. L. SNAPP OX 70615
COL. H. H. BRAUNSTEIN OX 59578

OPERATIONAL READINESS OFFICE
COL. D. L. SALLEE (Actg) OX 77715

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DIRECTOR OF SUPPLY BG T. H. SCOTT, JR. OX 50595	DIRECTOR OF MAINTENANCE BG JOHN P. TAYLOR OX 50601	DIRECTOR OF TRANSPORTATION COL REUBEN E. WHEELIS OX 56785
COMPTROLLER AND DIRECTOR OF PROGRAMS (VACANT) OX 77897	DIRECTOR OF MANAGEMENT SYSTEMS AND DATA AUTOMATION BG JACK E. BABCOCK OX 56600	DIRECTOR OF INTERNATIONAL LOGISTICS MG J. M. FINN OX 54500

INSPECTOR GENERAL COL. C. S. FREED OX 72876	INFORMATION OFFICER COL. H. D. KIGHT OX 78691	JUDGE ADVOCATE LTC J. E. MACKLIN, JR. OX 74609	GENERAL COUNSEL MR. K. M. BARNES OX 52081
Y OFFICE MERLO OX 43700	AVIATION OFFICE COL. W. B. DYER OX 71234	HISTORICAL OFFICE DR. DALE BIRDSELL OX 54492	ADMINISTRATIVE OFFICE COL. S. J. SAWICKI OX 59165

INATE COMMANDS

U. S. ARMY MOBILITY EQUIPMENT COMMAND ST. LOUIS, MO. 63120 (314) AM 3-1100 BG E. I. DONLEY	U. S. ARMY MUNITIONS COMMAND DOVER, N. J. 07801 (201) 328-4021 MG FLOYD A. HANSEN	U. S. ARMY TEST & EVALUATION COMMAND ABERDEEN PROVING GROUND, MD. 21005 (301) 278-5201 MG L. G. CAGWIN	U. S. ARMY WEAPONS COMMAND ROCK ISLAND, ILL. 61202 (309) 794-6001 BG W. J. DURRENBERGER

RESEARCH REPORTS

Authorized DOD contractors and grantees may obtain these documents without charge from:
Defense Documentation Center
Cameron Station
Alexandria, Va. 22314
Others may purchase these documents at the price indicated from:
Clearinghouse for Federal and Scientific Information
Department of Commerce
Springfield, Va. 22151

A Mixed Programing Formulation of a Weapons Allocation Problem. Ballistic Research Lab., Aberdeen Proving Ground, Md., Jan. 1967, 11 p. Order No. AD-645 813. $3.

Hardware Aids for Automata Design. Rand Corp., Santa Monica, Calif., for the Advanced Research Projects Aegncy, Dec. 1966, 36 p. Order No. AD-646 393. $3.

Adept—a Heuristic Program for Proving Theorems of Group Theory. M.I.T., for the Department of Defense, Sept. 1966, 181 p. Order No. AD-645 660. $3.

A Study of Shape Recognition Using the Medal Axis Transformation. Air Force Cambridge Research Labs, Bedford, Mass., Nov. 1966, 38 p. Order No. AD-646 258. $3.

Computer Science Research Review. Carnegie Institute of Technology, for the Advanced Research Projects Agency, Jan. 1967, 73 p. Order No. AD-645 294. $3.

The Development of the SDC System 360 Time-Sharing System. System Development Corp., Santa Monica, Calif., Dec. 1966, 22 p. Order No. AD-645 439. $3.

Manipulating Dates and Time Lapses in a Computerized Records System. USAF School of Aerospace Medicine, Brooks AFB, Tex., Sept. 1966, 17 p. Order No. AD-641 278. $3.

A Computer System for Inference Execution and Data Retrieval. Rand Corp., Santa Monica, Calif., for the Air Force, Sept. 1966, 32 p. Order No. AD-642 120. $3.

The Methodology of Control Panel Design. Bunker-Ramo Corp., Canoga Park, Calif., for the Air Force, Sept. 1966, 78 p. Order No. AD-646 442. $3.

The Role of Trial in The Acceptance and Adoption of New Equipment. Life Sciences, Inc., Fort Worth, Tex., for the Office of Naval Research, Aug. 1966, 69 p. Order No. AD-646 360. $3.

Increasing Team Proficiency Through Training. American Institutes for Research, Pittsburgh, Pa., for the Navy, May 1965, 61 p. Order No. AD-471 470. $3.

Human Factors Engineering Design Standard for Wheeled Vehicles. Army Human Engineering Labs, Aberdeen Proving Ground, Md., Sept. 1966, 187 p. Order No. AD-646 681. $3.

Resonant Beam and Ultrasonic Methods for Evaluation of Sintered Powder Steel Compacts. Springfield Armory, May 1966, 32 p. Order No. AD-646 580. $3.

Deep-Hole Drilling in the Manufacture of VKF Launchers. Arnold Air Force Station, Tenn., Nov. 1966, 15 p. Order No. AD-642 052. $3.

High Speed Deformation of Selected High-Strength Alloys: Effect on Mechanical Properties. Army Materials Research Agency, Watertown, Mass., Aug. 1966, 20 p. Order No. AD-640 023. $3.

Improved Cartridge Design Frankford Arsenal, Philadelphia, Pa., for the Air Force, Oct. 1966, 35 p. Order No. AD-645 273 $3.

Improvement of Forging Production: Generalization of Experience of Ural Plants. Translated from Russian by Translation Div., Wright-Patterson AFB, Ohio, July 1966, 200 p. Order No. AD-645 774. $3.

An Evaluation of the Spiral Point Drill Geometry. Rock Island Arsenal, Army Weapons Command, Rock Island, Ill., Sept. 1966, 34 p. Order No. AD-644 303. $3.

High Energy System (Organic Electrolyte). Electric Storage Battery Co., Yardley, Pa., for the Army, Sept. 1966, 126 p. Order No. AD-639 709. $3.

Battery Separator Mechanisms—Literature Survey Report. Naval Ordnance Lab., White Oak, Md., Sept. 1966, 48 p. Order No. AD-642 779. $3.

FC-2 Liquid Ammonia Reserve Battery. Naval Ordnance Lab., Corona, Calif., Nov. 1966, 61 p. Order No. AD-646 636. $3.

500 Watt Fuel Cell Powerplant. United Aircraft Corp., East Hartford, Conn., for the Army, Oct. 1966, 74 p. Order No. AD-640 700. $3.

Literature Survey on the Surface Structures of Refractory Metals with Reference to Thermionic Emission and Energy Converters. Northeastern University, Boston, Mass., for the Air Force, June 1966, 48 p. Order No. AD-636 954. $3.

GOVERNMENT PRINTING OFFICE PUBLICATIONS

These publications may be purchased at the prices indicated from:
Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

Electromagnetic Spectrum Utilization—The Silent Crisis, A Report on Telecommunication Science and the Federal Government by the Telecommunication Science Panel of the Commerce Technical Advisory Board. A study of trends in the technology and use of the electromagnetic spectrum and an examination of various methods of increasing the telecommunication capabilities of the nation through more effective use of the electromagnetic spectrum. 1966. 86 p. Catalog No. C 1.2:E12. 50¢

Design Manual Changes. Contains changes to the Design Manuals whose criteria consist of direction and standards for procedures, methods, dimensions, materials, loads and stresses as used in the design of facilities under cognizance of the Navy Bureau of Yards and Docks (now Naval Facilities Engineering Command). These changes, covering more than one manual, are combined in single publications as listed below: NAVDOCKS DM-1, DM-6, DM-35, DM-36, July 1965 through June 1966. 1966. 228 p. Catalog No. D 209.14/2:3,25,26/ch. $1.25 NAVDOCKS DM-3, DM-25, DM-26, July 1965 through June 1966, 1966. 240 p. Catalog No. D 209.14/2:3,25,26/ch. $1.50 NAVDOCKS DM-50, Change 2, July 1965 through June 1966. 1966. 134 p. Catalog No. D 209.14/2:50/ch 2. 60¢.

Department of Defense Selected Economic Indicators

The table on page 22 shows selected financial and employment data related to the impact of DOD programs on the economy. The tabular data cover seven major subject matter areas, beginning with the first quarter of calendar year 1966 and continuing through the latest month for which information is available. Figure 1 below covers three areas—obligations, expenditures and contracts—by quarter year.

Explanations of the terms used in the table follow.

Military Prime Contract Award.

A military prime contract award is a legally binding instrument executed by a Military Department or Defense Agency (DOD component) to obtain equipment, supplies, research and development, services, or construction. Both new instruments and modifications or cancellations of instruments are included; however, modifications of less than $10,000 each are not included.

The series includes awards made by DOD components on behalf of other Federal agencies, *e.g.*, National Aeronautics and Space Administration, and on behalf of foreign governments under both military assistance grant aid and sales arrangements. It also includes orders written by DOD components requesting a non-defense Federal agency to furnish supplies or services from its stocks, *e.g.*, General Services Adminstration stores depots; from in-house manufacturing facilities, *e.g.*, Atomic Energy Commission; or from contracts executed by that Federal agency.

The series does not include awards paid from post exchange or similar non-appropriated funds, nor does it include contracts for civil functions, such as flood control or river and harbors work performed by the Army Corps of Engineers. Project orders issued to DOD-owned-and-operated establishments, such as shipyards and arsenals, are not included, but contracts executed by such establishments are.

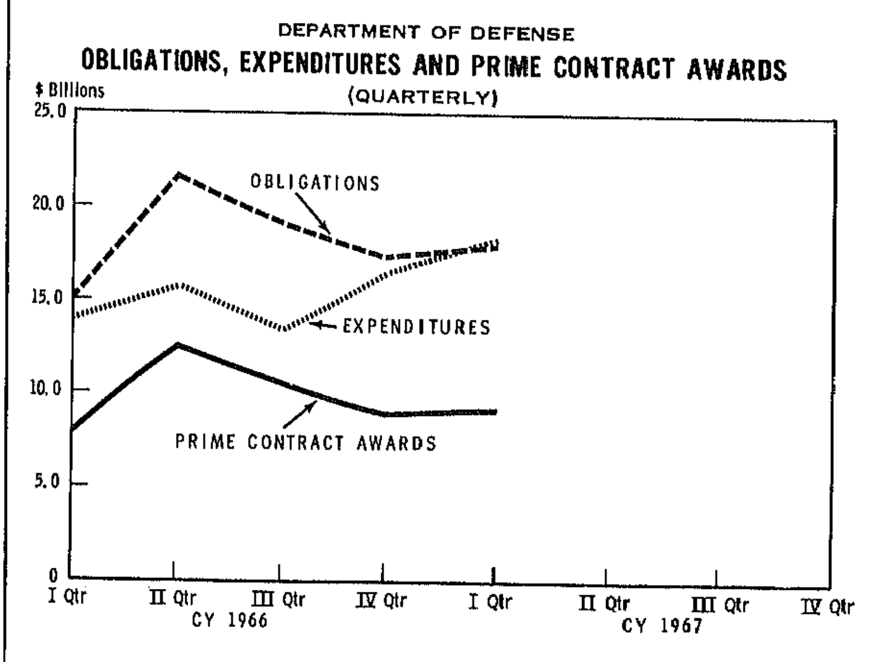


Figure 1.

The distribution by broad commodity group includes only contracts which are to be performed within the United States or its possessions. Each commodity group includes not only the indicated end item, but also associated components and spare parts, research and development, and maintenance or rebuild work. Electronics and Communications includes only such equipment and supplies as are separately procured by DOD components. Electronics procured by an aircraft prime contractor is reported as Aircraft. Other Hard Goods contains tank-automotive, transportation, production, medical and dental, photographic, materials handling, and miscellaneous equipment and supplies. Soft Goods includes fuels, subsistence, textiles and clothing. All Other contains services, *e.g.*, transportation, and all new contracts or purchase orders of less than $10,000 each. Commodity identification is not available for these small purchases.

Work done outside the United States refers to the location where the work will be physically performed. About 55 to 60 percent of this work is awarded to U. S. business firms, but a lesser percentage of the contract dollars in this category directly impacts on the U. S. economy.

Gross Obligations Incurred

Gross obligations incurred are total amounts recorded in official accounting records of the Military Departments and Defense Agencies from source documents, such as signed contracts or any instrument which legally binds the Government to payment of funds. Present coverage extends only to general fund accounts; obligations incurred in revolving funds are excluded. Included, and double-counted, are obligations which are recorded first when an order is placed by one appropriation upon another appropriation, and second when the latter appropriation executes an obligation for material or services with a private supplier. This duplication averages about eight percent of gross obligations.

SELECTED DEFENSE DEPARTMENT ECONOMIC INDICATORS

(Dollars in Millions; Manpower in Thousands; Quarters by Calendar Year)

	1966 I	II	III	IV	1967 Jan	Feb	Mar	I	Apr	May
I. Military Prime Contract Awards										
Aircraft	$ 1,945	$ 2,989	$ 2,696	$ 2,262	$ 784	$ 788	$ 530	$ 2,102	$ 432	$ 1,240
Missile & Space Systems	1,040	987	1,314	861	380	361	489	1,230	300	260
Ships	355	491	876	239	90	418	171	679	72	129
Weapons & Ammunition	555	1,486	692	940	346	215	257	818	279	518
Electr. & Communications Eqpt.	918	1,574	666	915	377	265	329	971	480	338
Other Hard Goods	843	1,842	660	1,029	267	305	343	915	298	362
Soft Goods	709	922	1,078	989	251	193	194	638	171	199
Construction	207	392	198	150	106	59	67	232	126	160
All Other	1,406	1,963	2,356	1,639	534	575	496	1,605	517	507
Total	7,978	12,646	10,536	9,024	3,135	3,179	2,876	9,190	2,675	3,713
Total, Seasonally Adjusted										
Work Outside U.S.	521	1,195	856	672	183	112	158	453	227	228
II. Gross Obligations Incurred										
Operations	8,326	9,604	10,426	9,702	3,495	3,226	3,508	10,229	3,664	
Procurement	4,374	8,539	5,368	5,276	1,738	1,451	1,924	5,113	1,801	
Other	2,429	3,470	3,453	2,230	823	774	922	2,519	726	
Total	15,129	21,613	19,247	17,208	6,056	5,451	6,354	17,861	6,191	
III. Gross Unpaid Obligations Outstanding										
Operations	3,828	3,867	4,792	5,024	5,041	4,892	4,644	4,644	4,761	
Procurement	18,203	21,944	22,736	23,173	23,134	22,982	22,780	22,780	22,613	
Other	5,898	6,709	8,051	7,627	7,557	7,469	7,228	7,228	7,159	
Total	27,749	32,520	35,579	35,824	35,732	35,343	34,652	34,652	34,533	
IV. Net Expenditures										
Operations	7,689	9,076	8,968	9,087	3,267	3,219	3,516	10,002	3,416	3,335
Procurement	3,651	3,886	4,392	4,264	1,680	1,491	1,903	5,074	1,783	1,850
Other	2,757	2,647	2,484	3,092	1,015	887	1,277	3,179	918	749
Total	14,097	15,609	15,844	16,443	5,962	5,597	6,696	18,255	6,117	5,934
V. DOD Personal Compensation										
Military	3,181	3,249	3,551	3,606	1,200	1,221	1,203	3,624	1,230	
Civilian	1,937	2,015	2,105	2,135	733	666	764	2,163	682	788 (p)
Total	5,118	5,264	5,656	5,741	1,933	1,887	1,967	5,787	1,912	
VI. Outstanding Payments										
Advance Payments	66	79	90	83				92		
Progress Payments	4,402	4,346	4,750	5,461				5,981		
V Loans	53	51	52	55				112		
Total	4,521	4,476	4,892	5,599				6,185		
VII. Strength (Manpower)										
Military	2,969	3,094	3,229	3,334	3,357	3,368	3,371	3,371	3,373 (p)	
Civilian	1,088	1,138	1,184	1,230	1,246	1,260	1,268	1,268	1,273 (p)	

(p)—preliminary.

Directorate for Statistical Services, OASD (Comptroller)
June 30, 1967

Operations. The Military Personnel appropriation and Operation and Maintenance appropriation of the Defense Department.

Procurement. The Procurement appropriation.

Other. The Research, Development, Test and Evaluation appropriation, and Military Construction, Family Housing, Civil Defense, and Military Assistance appropriations.

Gross Unpaid Obligations Outstanding.

Obligations incurred by DOD for which it has not yet expended funds.

Net Expenditures.

Gross payments less collections by the Military Departments and Defense Agencies, including military assistance. Payments represent checks issued.

DOD Personal Compensation.

Personal Compensation represents wages and salaries earned by personnel employed by DOD. Military compensation represents pay and allowances to active duty personnel; reserve pay and retired pay are excluded. Civilian compensation represents gross pay and includes lump sum payments for final annual leave. Both figures are inclusive of individual contributions to retirement and social insurance funds, but are exclusive of any employer contributions to these funds.

Outstanding Payments.

These are payments to contractors by the Military Departments and Defense Agencies made before the goods or services contracted for are completed and delivered.

Advance Payments. Payments to contractors in advance of performance of a contract.

Progress Payments. Payments to contractors as work progresses on a contract. These payments serve to reimburse the contractor for a major portion of the costs incurred to date.

V-Loans. Loans by commercial banks to defense contractors in advance of completion of work, in which the Government agrees to share any losses resulting from default.

Strength.

These figures represent the number of persons on active duty with DOD at the end of the period.

Military. Men and women on continuous or extended active duty. Excludes reserves on temporary active duty for reserve training.

Civilian. Direct hire personnel.

Contracts Compliance Office Transferred to Defense Supply Agency

The Defense Contracts Compliance Office, responsible for assuring equal opportunity employment on all defense contracts as required by Executive Order 11246, became a part of the Defense Supply Agency's Defense Contract Administration Services (DCAS) on July 1, 1967.

The transfer ties together, for the first time, the office responsible for elimination of discrimination by defense contractors and the contracting officials responsible for administering defense contracts. This direct relationship will assure increased effectiveness of the Defense Contracts Compliance Program. The Compliance Office headquarters has 22 civilian employees in Washington, D.C., and 149 field representatives located in cities across the country.

No change in the size or composition of the Compliance Office is anticipated. The Secretary of Defense has directed that the transfer assure that the separate identity of the Compliance Office and its personnel within the DCAS organization is retained.

Beginning in 1962, the three Military Departments and the Defense Supply Agency established separate contracts compliance offices. These were consolidated on July 1, 1966, under the Office of the Assistant Secretary of Defense (Manpower), with certain administrative support functions for the field offices assigned to the 11 DCAS regions.

Subsequent experience, supplemented by a detailed management survey, demonstrated that the 171-member contracts compliance organization, supported by and aligned with the DCAS nation-wide program, would be more effective and have a greater impact on defense contractors. Policy direction and guidance of the Contracts Compliance Program will be retained in the Office of the Assistant Secretary of Defense (Manpower) to assure continued high priority attention throughout DOD.

The Defense Contracts Compliance Office headquarters group is located in Room 8A 489, Building 8, at Cameron Station, Duke Street, Alexandria Va. Field offices will be located in the DCAS regions headquartered at the following cities: Atlanta, Ga.; Boston, Mass.; Chicago, Ill.; Cleveland, Ohio; Dallas, Tex.; Detroit, Mich.; Los Angeles, Calif.; New York, N.Y.; Philadelphia, Pa.; St. Louis, Mo.; and San Francisco, Calif.

USAF Civil Engineering R&D Goes to Kirtland AFB

All Air Force civil engineering research and development has been centralized at the Air Force Weapons Laboratory (AFWL), Kirtland AFB, N. M.

As the "lead laboratory" for civil engineering, AFWL will conduct or manage all exploratory and advanced development in this area, and will provide technical guidance and direction for the entire civil engineering program of the Air Force.

The new role of the laboratory will speed up vitally needed civil engineering projects in Southeast Asia and at Air Force installations world-wide. The laboratory's Civil Engineering Branch will carry out the new mission.

Navy Develops New Fire-Fighting Foam

A portable high-expansion, foam-generating system, developed by the Naval Applied Science Laboratory, will soon be delivered to fleet units and Navy fire-fighting schools.

The new foam system was developed to combat liquid fuel fires in engine, boiler and machinery spaces aboard ships.

High expansion foam, unlike conventional fire-fighting agents, can fill a ship's compartment in a few minutes, flowing over and around obstructions and engulfing fires.

The new agent can be applied from outside a compartment through a hatch opening, while conventional agents must be applied directly on a fire. A swivel-mounted door permits operators to direct the foam horizontally or vertically.

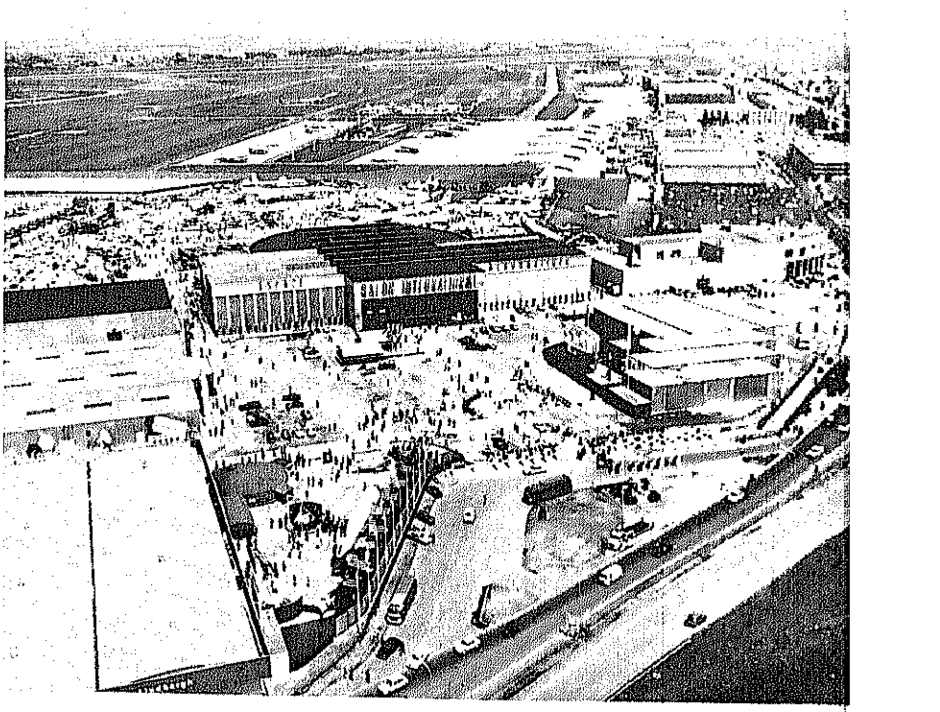
Report on Paris Air Show 1967

The Paris Air Show, held every other year at Le Bourget Airport, is the outstanding international forum for the display of aerospace technology. Participation at this event is motivated by a variety of goals and is in a variety of forms, from national pavilions stressing the state of various technologies to aircraft equipment manufacturers expecting to actually take orders for equipment; from Military Service acrobatic teams displaying their precision flying skills to company presentations geared to a specific customer audience. In short, every sort of exhibiting group attempts to educate every sort of customer audience. Paris 1967 was no exception to this.

U. S. participation at Paris 1967 represents the best planned and coordinated effort of U. S. Government and industry to date. Planning for this participation began almost two years ago and involved a major effort on the part of all agencies involved, especially the Department of Commerce. The Department of Commerce provided professional talent to organize and implement the unified U. S. participation. An impressive and strategically located U. S. pavilion, based on the theme of U. S. aerospace technology from Lindbergh's time until today, the 40th anniversary of Lindbergh's flight, housed displays by the Federal Aviation Agency, the U. S. Information Agency, the Environmental Science Services Administration, the Communications Satellite Corp., the Atomic Energy Commission, the National Aeronautics and Space Administration, as well as 16 major aerospace States received a very good press. President de Gaulle, scheduled for 10 minutes in the U. S. pavilion, spent 30 minutes, including a discussion with our astronauts. Meetings of U. S. and Russian astronauts were unofficially arranged and received wide press coverage.

The Defense Department static aircraft exhibit was certainly our most interesting and best balanced showing at Paris to date. It included:

- Exotic technical developments in aerospace like the F–111A variable geometry tactical fighter, the XC–142 tilt-wing VTOL transport aircraft, and the CL–286 rigid-rotor helicopter.
- In addition, seven other new aircraft, none previously shown at Paris, the OV–10A, A–7A, CH–53A, AH–1G, TA–4F, RF–4 and the HH–3E.
- Aircraft shown before at Paris representing potential to meet other nations' defense requirements or currently in use or on order by other nations, including the OH–6, CH–47, OV–1, UH–46, P–3A and C–141.
- Aircraft representing international defense and industrial cooperation like the UH–1 helicopter produce by Italy and the Federal Republic o Germany; the A–7A, planned to incorporate the British Rolls Royce engine (for the U. S. Air Force A–7D) the UH–46 helicopter under produc tion in Japan; the F–4, currentl being produced approximately 50 per cent each in the United States an the United Kingdom for British requirements; and the F–5, now i production in Canada and Spain.
- Aircraft indicative of the civilia application of defense-designed equipment, including the OH–6 helicopte and its civilian counterpart, th Hughes 500 executive transport; th civilian version of the C–130 an C–141, the Lockheed 100 and 20 respectively; and the HH–3E repre senting the S–61 family of Sikorsk helicopters.
- Aircraft representing the gamu of size and propulsion from the C–14 transport to the OH–6 light heli copter; speed from the Mach-2-plu



F–111 tactical fighter to the STOL OV–10 close support attack aircraft; and missions from flying hospitals to reconnaissance at more than twice the speed of sound.

The 19 Defense Department aircraft, with their related civilian aircraft and flying displays, represented a complete picture of U. S. defense aviation. As the British press described the U. S. display, "Although the Russians have played all the aces . . . the United States holds the aircraft trump cards."

The following is a listing of the aircraft in the DOD display:

• **The U.S. Navy UH–46 Sea Knight which is the military application of the twin-turbine Boeing Vertol 107 helicopter.** The 107 is in use by the Royal Canadian Air Force and Army for search/rescue and troop transport; by the Royal Swedish Navy and Air Force for minesweeping, antisubmarine warfare, and search/rescue missions; and, through a Japanese licensee, by the Japanese Maritime, Ground and Self Defense Forces, and commercial operators.

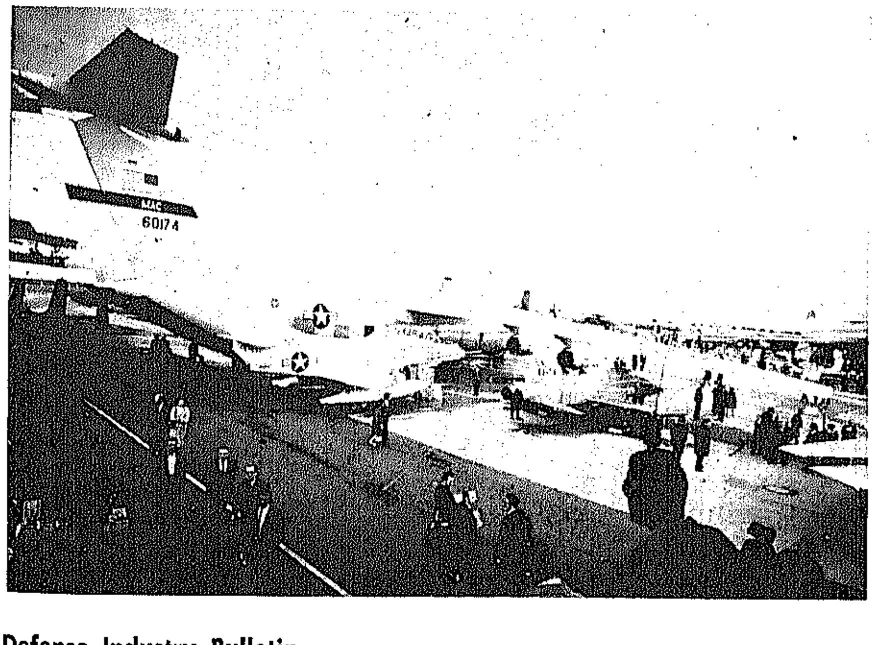
• **The U.S. Army twin-turbine, medium cargo helicopter, the CH–47 Chinook.** Made by Boeing, it is soon to be delivered to the United Kingdom's Royal Air Force.

• **Currently in initial production by North American Aviation to meet U. S. Marine Corps and U. S. Air Force requirements, the OV–10 Bronco, shown at Paris for the first time.** In its present military version, as well as its potential cargo (or large hull) modifications, **it** should be of interest to many nations to meet a variety of requirements. The OV–10A was specifically designed for low-cost, close-in battlefield operations. Faster and more tactically versatile than helicopters, and slower but more maneuverable than jets, it utilizes tactics and provides capabilities not possible with either. STOL performance rough field landing gear, low maintenance/support requirements which permit operations from austere airfields, outstanding visibility, maneuverability over a wide speed range, rugged construction, complete air-to-air and air-to-ground communications, and flexible ordnance provisions make the Bronco effective for a variety of missions, including border patrol, helicopter escort, forward air control, armed reconnaissance, close air support and, with its 100-cubic-foot cargo bay and jeep-like operating characteristics, suitable for a variety of utility or nation building roles.

• **Produced by the Hughes Tool Co., the U. S. Army observation helicopter, the OH–6A Cayuse, shown along with its commercial counterpart, the Model 500 executive transport.** The turbine-powered Cayuse has set 23 official world records for speed, distance, climbing and sustained altitude—a feat never before attained by any other rotary-winged aircraft. The Hughes 500 offers businessmen faster point-to-point travel than fixed-winged airplanes with its ability to cruise for 450 miles at 150 miles per hour directly from one industrial heliport to another.

• **Two Sikorsky helicopters, the CH–53A and HH–3E, displayed at Paris for the first time.** The U.S. Marine Corps CH–53A, with a maximum gross weight of 42,000 pounds, cruise speed of 172 miles per hour and maximum speed of 195 miles per hour, is designed for a variety of missions, such as the transport of 48 fully equipped troops or 24 litter patients plus medical attendants. Another version, the HH–53B, is now in production for the U. S. Air Force. The U. S. Air Force HH–3E is a version of the Sikorsky S–61 family. It is assigned to the world-wide Aerospace Rescue and Recovery Service. Equipped with long-range fuel tanks and air refueling capabilities, the HH–3E can be deployed over long ranges for the rescue and recovery of downed airmen and returning astronauts. The HH–3E weighs 22,050 pounds loaded and cruises at 154 miles per hour. It has a 748-mile range without inflight refueling. Its refuel range capabilities were dramatically displayed by the non-stop, trans-Atlantic flight staged during the show.

• **The Lockheed Rigid Rotor Model 286, shown at Paris for the first time.** It is an FAA-certificated helicopter in direct descent of the XH–51A development, jointly sponsored by the U. S. Army and Navy and produced primarily to demonstrate the advanced state-of-the-art flying qualities inherent in this new rotor system. Its flight display included loops and rolls. An XH–51A aircraft, modified as a compound aircraft (with wings and auxiliary propulsion) was flown at more than 270 knots in the 1965 Paris Air Show. The XH–51A Model 286 and XH–51A compound helicopters were key stepping stones in the development of the Army's AH–56A, Advanced Aerial Fire Support System vehicles—the first of which was formally rolled out early in May of this year. This type of rigid rotor helicopter represents an im-



provement in rotary wing technology and should have an impact on the spectrum of military and civilian helicopter roles.

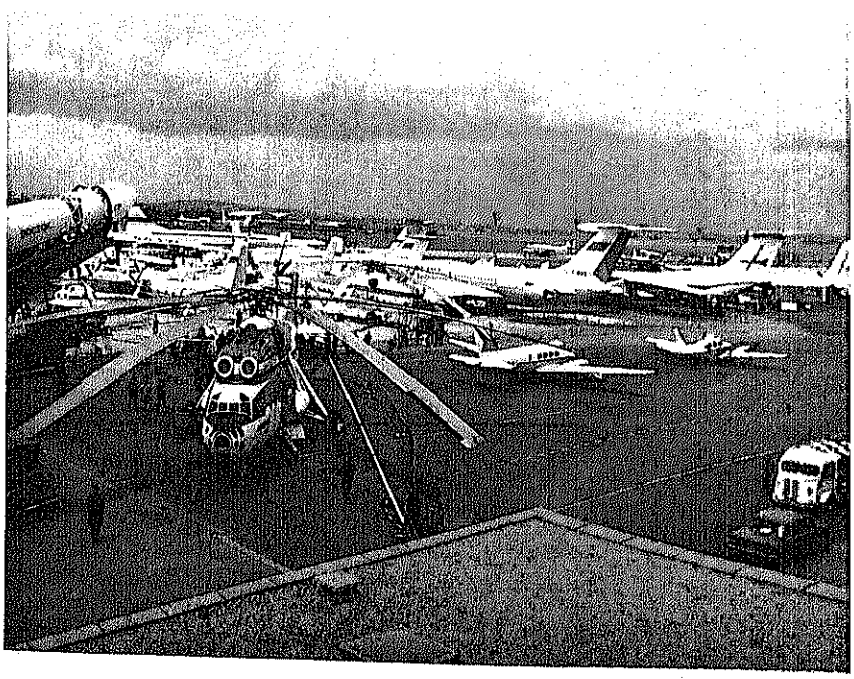
• The F–5 Freedom Fighter, produced by Northrop Corp. The aircraft is a supersonic tactical fighter in service with 10 allied nations—Iran, The Republic of Korea, Greece, The Republic of the Philippines, The Republic of China, Turkey, Norway, Thailand, Ethiopia and Morocco—and will be produced under license agreements by Spain and Canada, with Canadian-produced CF–5s going additionally to The Netherlands. The airplane is also under evaluation by Belgium, Denmark, Switzerland, Austria and New Zealand for possible acquisition. The F–5, like its sister aircraft the U. S. Air Force trainer T–38, provides high performance in a relatively simple, economical, safe, and easily maintained design. From its inception, the F–5 program was envisioned as an international program. Through a combination of advanced technology and operational simplicity, the F–5 reversed the complexity trend, while retaining full combat effectiveness.

• The U.S. Air Force Military Airlift Command C–141 fanjet flying hospital transport aircraft, which is performing life-saving missions daily. It can transport 80 patients with eight attendants. As a cargo carrier, it can airlift more than 70,000 pounds of equipment. It is the first jet with straight-in, truckbed level loading, enabling it to handle outsized cargo and take full advantage of mechanized loading systems. The C–141 Starlifter is a step forward from the C–130 Hercules propjet transport, which is in service with the U. S. Air Force, Navy, Marines, and Coast Guard, and with 14 other nations. A civil version of the Hercules, the Lockheed 100, which will transport 50,000 pounds of freight, was also on display along with the civil version of the C–141, known as the Lockheed 200. Several nations are considering acquisition of the C–141 and the Lockheed 200.

• The U.S. Navy P–3 Orion, built by Lockheed. This is the most advanced U. S. anti-submarine patrol and maritime reconnaissance aircraft. Equipped with electronic detector devices representing the latest state of the art, the long-range, land-based Orion protects the free world's sea lanes by operating from the U. S. Navy's Atlantic and Pacific Fleet outposts around the world. Orions are also in service in the Royal New Zealand Air Force and will join the Royal Australian Air Force early in 1968. Other navies are also considering the Orion for modernization of their airborne anti-submarine warfare and maritime patrol fleets. Acquisition and operation of the P–3 by New Zealand and Australia establishes a high degree of international cooperation and commonality in anti-submarine defense and establishes the P–3 as an international submarine hunter like its predecessor, the Lockheed P–2 Neptune, which flies in the anti-submarine warfare and maritime patrol forces of the United States and eight other free world nations.

• One of the most dramatic aircraft at Paris 1967, the F–111 swing-wing tactical fighter, made by General Dynamics Corp. Developed as an Air Force/Navy aircraft, it is capable, in its various configurations, of performing tactical fighter, tactical reconnaissance, carrier intercept, and long-range bombing missions. Its flexibility is the result of its radical swing-wing design, which provides high lift for minimum roll take-offs with maximum loads but low drag in the swept configuration for supersonic flight. This design feature planned for inclusion in the Boein designed supersonic transport, as we as for the Anglo-French swing-wir fighter. The F–111A has been select by Australia and the United Kin dom for inclusion in their defen forces and is currently being pr cured.

• The Grumman E–2A Hawkeye, twin-turboprop airborne early war ing and intercept control aircraft i current production. The prime mi sion of the Hawkeye is to dete high Mach number attacking aircra at a point sufficiently distant facilitate destruction before the a tacking force can deliver its weapon Designed for all-weather operatio from aircraft carriers or shore base the E–2A patrols the extremes defense perimeter. Its high resoluti radar can detect attacking aircra miles away, track and evaluate t attack, store and assemble the info mation, and relay it through hig speed data links to tactical contro lers. It can also direct the inte ception of attacking aircraft. As command and control vehicle, t system performs many functions aut matically. The E–2A is easily ide tified by the huge saucer-like rot dome atop its fuselage containing t long-range radar antenna.

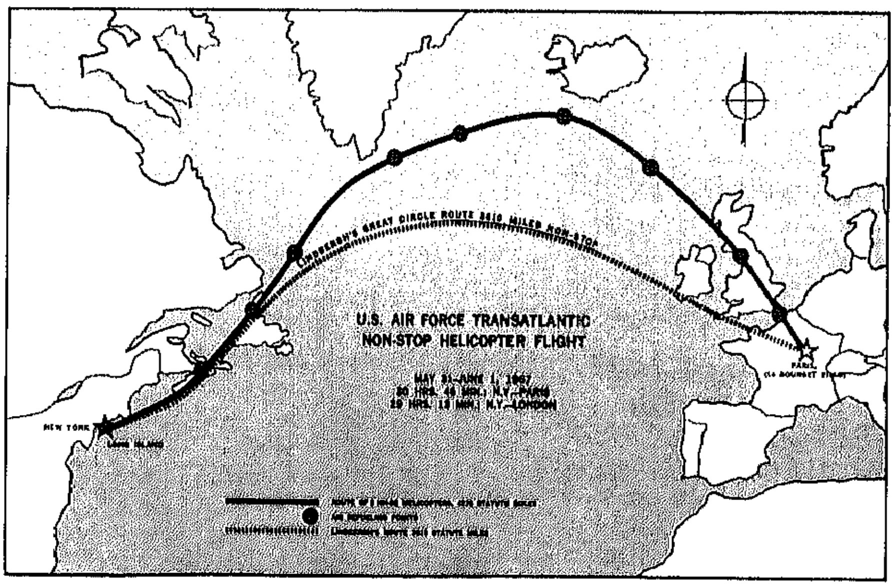


• **The F–4 Phantom, along with the Sparrow missile and advanced avionics, the best tactical fighter flying today.** The inherent flexibility of the Phantom's building-block design has made it readily adaptable to the defense and industrial needs of its users. It has been produced with eight marks of three different radars, seven marks of two different engines, five versions (marks) of three different air-to-air missiles, three alternative navigation systems, internal or external guns and over 20 optional equipment items. This building-block design and equipment flexibility has also made possible cooperative production programs for international customers. The British content in Phantoms for the Royal Air Force approaches 50 percent. It includes engines from Rolls Royce; aft fuselage, empennage and engine doors from BAC; outer wings from Short Brothers; fuel cells from Marston Excelsior; nav-attach systems from Ferranti; titanium blankets from Delaney Galley; ejection seats from Martin-Baker; reconnaissance pods from EMI and Hawker Siddely; hydraulics from Dunlop, Elector Hydraulics, and Hobson, Ltd.; and avionics from Ultra Electronics, Ltd., Standard Telephones and Cables, Normalair, Rotax, Louis Newmark, Elliott, Marconi Co., Cossor Electronics, Ltd., S. Smith, Sons, Redifon, and others. These systems are integrated into the F–4Ks and F–4Ms by the McDonnell-Douglas Corp. in a good example of a smoothly functioning international co-production program. The most recent model of the Phantom II, the F–4E, includes, in addition to the Sparrow and Falcon missiles, an internally mounted M–61 gatling gun which fires 20mm shells at the rate of 4,000 to 6,000 rounds per minute. One of the specialized versions of the McDonnell F–4, shown at Paris for the first time, is the U. S. Air Force and Marine Corps RF–4 reconnaissance aircraft. This aircraft has the latest sensor and photographic equipment. It is the most modern and complete reconnaissance aircraft flying today. It has been evaluated for possible use by the Federal Republic of Germany.

• **The A–7 Corsair II, shown for the first time at Paris.** This is the Navy version of this versatile aircraft, designed and produced by Ling-Temco-Vought. Its similarity in appearance to the F–8 Crusader aircraft, flown by the U. S. Navy and Marine Corps and the French Navy, reflects its derivation from that design. The Navy version, powered by the Pratt and Whitney TF30–P6 engine (in the 10,000-pound thrust category), is designed primarily for operation from the Navy's aircraft carriers. The U. S. Air Force has ordered the A–7D version of the same airplane with the Allison TF–41 Rolls Royce Spey engine. The Spey engine, which develops approximately 14,000 pounds of thrust, adapts the airplane with its large load-carrying ability and inherent long range to land-base and forward-field operations. Among the outstanding features of the A–7 is its long range/load capability and its ease of maintenance. Two Navy A–7A aircraft were flown non-stop, without inflight refueling, from Washington, D.C., to Mildenhall, England, near London.

• **The Grumman OV–1 Mohawk surveillance system, an Army tactical reconnaissance aircraft.** Flying in friendly skies, its side-looking radar (SLAR) provides the interpreter seated beside the pilot an image of ground targets in unfriendly territory about one minute after the picture has been taken. This near-instantaneous battlefield intelligence system allows constant following of the flow of battle. The SLAR can be used in all weather, day or night, without ever exposing the aircraft to enemy fire, although the OV–1, with its armor and its rugged and reliable construction, is clearly designed to be in the thick of the battle. For its tactical role it is also equipped with camera and infrared sensing devices. The OV–1 can perform over a wide speed range (it claims five world records for its class—one for closed circuit speed, two for time to climb, one for sustained altitude, and one for endurance) and is capable of rough field, forward area operation.

• **The XC–142 tri-Service V/STOL transport, shown for the first time at Paris.** Manufactured by Ling-Temco-Vought, it has successfully proven the feasibility of the tilt-wing turboprop concept for vertical take-off and landing of cargo-type transport airplanes. The tilt-wing concept has the dual advantage of carrying heavier loads with very short take-off and landing distances. The SC–142 is currently undergoing service tests by all three U. S. Military Services. The SC–142A is designed to carry 32 fully equipped combat troops or 8,000 pounds of cargo, utilizing the vertical take-off modes over an operational radius of approximately 230 statute miles. By using intermediate wing positions for short take-off and landing, greater loads may be carried for longer distances. The rear loading cargo door



permits full width access to the cargo compartment as well as facilitating air drops of cargo. The conventional cargo type parachute method has been demonstrated, as has a new technique of the "dump truck" wherein the fuselage is trimmed nose high and the cargo is permitted to free fall from a low altitude at the very low flight speed this design permits.

• The Bell UH-1 Iroquois helicopter, a familiar aircraft since it is in use in 25 countries in both its military variations and the corresponding commercial configurations, the Bell 204 and 205. More than 3,000 of these aircraft have been produced in the United States, and the aircraft is still in mass production. The UH-1 is also produced in Italy and the Federal Republic of Germany. Aircraft from the Italian production line, in addition to meeting Italian requirements, have been sold to Sweden, Netherlands, Switzerland, Saudi Arabia, Australia, Spain, Lebanon and Turkey. The UH-1 was the first turbine-powered helicopter and won 21 world records in 1964. It still possesses 19 of these records—11 for speed, three for time to climb, three for distance and two for altitude.

• The AH-1G Cobra, developed by Bell based on the UH-1 design. It has 50 percent commonality. The Cobra is the first helicopter designed specifically as a helicopter escort and fire-suppression helicopter. It was shown for the first time at Paris. The fuselage of the Cobra is only 36 inches wide.

• The new Douglas A-4F (single place) and TA-4F (two place), the latest in the famous Skyhawk series of ground-attack aircraft being flown by the U. S. Navy and Marine Corps. The Skyhawk was specifically designed as a rugged, easy to maintain light-weight, ground-attack bomber. The A-4s, operating from carriers, land bases, and short airfield tactical system facilities, have established an outstanding combat record for overall combat performance, ability to absorb battle damage, ease of maintenance and availability of up to 90 percent even under extreme field conditions. The TA-4F is being delivered to the U. S. Navy for use as an operational flight trainer.

Unlike Paris 1965, which was dominated by military aircraft, the United States this year also displayed numerous commercial aircraft including the prestigious stretched DC-8-61, the Lockheed 100 and 200 cargo aircraft, and the extraordinary Mini-Guppy.

In addition to participation by the U. S. Air Force Thunderbirds and the U. S. Navy Blue Angels, the Defense Department staged the first trans-Atlantic, non-stop flight of two HH-3E helicopters to Paris. The ocean-hopping Sikorsky HH-3Es, of the U. S. Air Force 48th Aerospace Rescue and Recovery Squadron, averaged 131 miles an hour, bucking headwinds for much of the flight. They were refueled in flight nine times by four HC-130P tanker planes.

Claims for world helicopter speed records—from New York to London and New York to Paris—have been submitted to the Federation Aeronautique Internationale, the ruling body for such records. Speed claimed was 30 hours, 46 minutes for the New York to Paris hop, and 29 hours, 13 minutes for the flight from New York to London.

The arrival of the HH-3Es at Le Bourget was the highlight of the air show's Helicopter Day. Appropriately, the theme for Paris 1967 was "In the Spirit of Lindbergh," in honor of Charles A. Lindbergh who, 40 years ago, made the first non-stop, trans-Atlantic solo flight.

List of Participating Companies in Paris Air Show 1967

Aerospace Companies

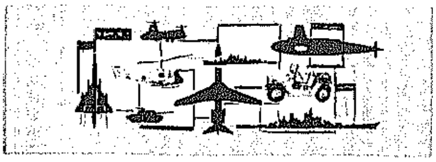
Beech Aircraft Co.
Bell Helicopter Co.
The Boeing Co.
The Garrett Corp.
General Dynamics Corp.
General Electric Co.
Litton Industries
Lockheed Aircraft Corp.
LTV, Inc.
McDonnell-Douglas Corp.
North American Aviation, Inc.
Northrop Corp.
Pan American World Airways
Trans World Airlines
United Aircraft Corp.
Wyman-Gordon Co.

Aerospace Subsystem Companies (Commercial Area)

Abex Corp.
Aeromaritime, Inc.
Aeroquip Corp.
Airco Supply Co.
Allen Aircraft Radio, Inc.
Ampex Great Britain
Anglo-American Aviation
Astra Aircraft Corp.
Atlantic Research Corp.
Baird-Atomic, Inc.
Bild Industries
Borg-Warner International
Brodsky, Hopf & Adler
Chicago Aerial Industries
Conductron Corp.
Del Mar Engineering Laboratories
Dorne & Margolin
Eastern Stainless Steel Corp.
General Connectors Corp.
General Precision, Inc.
Gray Co.
Hardman Tool & Engineering Co.
Hazeltine Corp.
Honeywell, Inc.
Inflight Motion Pictures
Laboratory for Electronics
Latrobe Steel Co.
Lawrence Electronics
Link Group (General Precision, Inc.)
Lockheed-California Co.
Motorola, Inc.
Northeast Aircraft Corp.
RCA Aviation Equipment Dept.
REA International Corp.
Ryan Aeronautical Co.
Schick Products
Standard Pressed Steel Co.
Stratoflex, Inc.
United Control Corp.
Voltron Products
Westinghouse Electric International
Wyman-Gordon Co.
Zep Aero

Aerospace Companies (Outside U. S. Pavilion)

Bendix Corp.
Cessna Aircraft Co.
Grumman Aircraft Engineering Cor
Hughes Aircraft Co.
IBM Corp.
ITT Corp.
Kollsman Instrument Corp.
Martin Co.
Piper Aircraft Corp.
Rockwell-Standard Corp.



DEFENSE PROCUREMENT

Contracts of $1,000,000 and over awarded during the month of June 1967:

DEFENSE SUPPLY AGENCY

1—**Page Airways, Inc.**, Rochester, N.Y. $2,015,746. Operation and maintenance activities at the Defense Industrial Plant Equipment Facility, Atchison, Kan. Defense Industrial Plant Equipment Center, Memphis, Tenn.

—**J. P. Stevens & Co.**, New York, N.Y. $1,721,250. 450,000 linear yards of wool serge cloth. New York. Defense Personnel Support Center, Philadelphia, Pa.

2—**Marmac Industries**, Marysville, Mich. $1,264,976. 368,674 steel-helmet liners. Defense Personnel Support Center, Philadelphia, Pa.

5—**Shell Oil Co.**, New York, N.Y. $2,041,597. Petroleum products and services. Defense Fuel Supply Center, Alexandria, Va.

—**Standard Oil Co. of Calif.**, San Francisco, Calif. $2,200,000. Fuel oil, gasoline and solvents for installations in Alaska. Defense Fuel Supply Center, Alexandria, Va.

—**International Paper Co.**, New York, N.Y. $1,220,908. 2,725,280 fiberboard boxes. Defense Personnel Support Center, Philadelphia, Pa.

6—**Gulf Oil Corp.**, Houston, Tex. $3,432,973. 14,244,000 gallons of fuel oil, 8,715,000 gallons of gasoline and 4,425,000 gallons of diesel. Defense Fuel Supply Center, Alexandria, Va.

—**American Oil Co.**, Chicago, Ill. $1,626,384. 9,868,000 gallons of gasoline, 115,000 gallons of fuel oil and 2,000 gallons of diesel. Defense Fuel Supply Center, Alexandria, Va.

—**Atlantic Richfield Co.**, Philadelphia, Pa. $1,304,474. 7,433,000 gallons of gasoline. Defense Fuel Supply Center, Alexandria, Va.

7—**Manteo Mfg. Co.**, Manteo, N.C. $1,432,074. 14,613 tent liners for medium-size general purpose tents. Defense Personnel Support Center, Philadelphia, Pa.

—**Usibelli Coal Mine**, Fairbanks, Alaska. $1,428,000. 272,000 tons of coal. Defense Fuel Supply Center, Alexandria, Va.

8—**Vitro Minerals Corp.**, New York, N.Y. $1,412,500. 250,000 tons of coal. Defense Fuel Supply Center, Alexandria, Va.

9—**Royal Lubricants Co.**, Hanover, N.J. $3,209,777. 831,229 gallons of aircraft engine lubricating oil. Defense Fuel Supply Center, Alexandria, Va.

—**Aluminum Co. of America**, Pittsburgh, Pa. $3,360,000. 10,200,000 lbs. of aluminized powder. Defense General Supply Center, Richmond, Va.

12—**Dowling Bag Co.**, Valdosta, Ga. $2,305,900. 12,000,000 osnaburg sandbags. Defense General Supply Center, Richmond, Va.

13—**Newell Clothing Co.**, Vineland, N.J. $1,133,932. Men's wool serge coats. Defense Personnel Support Center, Philadelphia, Pa.

14—**Cavalier Bag Co.**, Lumberton, N.C. $3,028,000. 16,000,000 osnaburg sandbags. Defense General Supply Center, Richmond, Va.

—**Consolibag Co.**, Philadelphia, Pa. $1,772,000. 8,800,000 osnaburg sandbags. Defense General Supply Center, Richmond, Va.

—**Pioneer Bag Co.**, North Kansas City, Mo. $1,305,590. 6,400,000 osnaburg and/or polypropylene sandbags. Defense General Supply Center, Richmond, Va.

CONTRACT LEGEND

Contract information is listed in the following sequence: Date—Company — Value — Material or Work to be Performed—Location of Work Performed (if other than company plant) — Contracting agency.

16—**Davidson & Co., Ltd.**, Taipei, Taiwan. $3,446,398. 708,590 nylon pneumatic mattresses. Defense Personnel Support Center, Philadelphia, Pa.

—**Mauney Hosiery Mills**, Kings Mountain, N.C. $1,023,562. 3,389,280 pairs of men's black cotton-nylon socks. Defense Personnel Support Center, Philadelphia, Pa.

—**Ellis Hosiery Mills**, Hickory, N.C. $1,031,640. 3,600,000 pairs of men's black cotton-nylon socks. Defense Personnel Support Center, Philadelphia, Pa.

—**Evan Jones Coal Co.**, San Francisco, Calif. $2,704,800. 210,000 tons of coal. Defense Fuel Supply Center, Alexandria, Va.

21—**Hunter Outdoor Products**, Long Island City, N.Y. $1,108,781. 4,914 command post tents and 371 tent wall screens. Defense Personnel Support Center, Philadelphia, Pa.

—**De Rossi & Son Co.**, Vineland, N.J. $2,724,000. 150,000 men's wool serge coats. Defense Personnel Support Center, Philadelphia, Pa.

—**Tursini & Co.**, Vineland, N.J. $1,452,000. 75,000 men's wool serge coats. Defense Personnel Support Center, Philadelphia, Pa.

—**Cherribino Petti & Co.**, Atlantic City, N.J. $1,116,600. 60,000 men's wool serge coats. Defense Personnel Support Center, Philadelphia, Pa.

22—**Varian Associates**, San Carlos, Calif. $1,385,265. Transmitting tubes. Defense Electronics Supply Center, Dayton, Ohio.

23—**American Oil Co.**, Chicago, Ill. $1,166,373. 270,000 barrels of diesel marine fuel oil. Defense Fuel Supply Center, Alexandria, Va.

—**Aluminum Co. of America**, Pittsburgh, Pa. $1,378,872. 4,178,000 lbs. of aluminum powder. Defense General Supply Center, Richmond, Va.

—**Booth Packing Co.**, Modesto, Calif. $1,179,264. Assembly of 1,577,417 cases of combat meals. Defense Personnel Support Center, Philadelphia, Pa.

—**Southern Packing & Storage Co.** $1,150,586. 1,657,000 cases of combat meals. Defense Personnel Support Center, Philadelphia, Pa.

26—**General Electric**, Owensboro, Ky. $1,055,826. Electron tubes. Defense Electronic Supply Center, Dayton, Ohio.

—**Shell Oil Co.**, New York, N.Y. $3,124,125. Fuel oil and gasoline. Defense Fuel Supply Center, Alexandria, Va.

—**Armour Oil Co.**, San Diego, Calif. $1,279,823. Fuel oil and gasoline. Defense Fuel Supply Center, Alexandria, Va.

27—**Cavalier Bag Co.**, Lumberton, N.C. $4,715,332. 24,000,000 sandbags. Defense General Supply Center, Richmond, Va.

—**Dowling Bag Co.**, Valdosta, Ga. $3,702,641. 18,000,200 sandbags. Defense General Supply Center, Richmond, Va.

—**Consolibag, Inc.**, Philadelphia, Pa. $2,693,113. 13,200,100 sandbags. Defense General Supply Center, Richmond, Va.

—**Pioneer Bag. Co.**, North Kansas City, Mo. $1,974,678. 9,599,800 sandbags. Defense General Supply Center, Richmond, Va.

—**Delta Petroleum Co.**, New Orleans, La. $1,740,485. 3,557,290 gallons of lubricating oil. Defense Fuel Supply Center, Alexandria, Va.

28—**Genesco, Inc.**, Nashville, Tenn. $1,927,240. 212,000 pairs of tropical combat boots. Defense Personnel Support Center, Philadelphia, Pa.

—**Endicott-Johnson Corp.**, Endicott, N.Y. $1,493,375. 162,500 pairs of tropical combat boots. Defense Personnel Support Center, Philadelphia, Pa.

—**Randolph Mfg. Co.**, Randolph, Mass. $2,406,436. 259,594 pairs of tropical combat boots. Defense Personnel Support Center, Philadelphia, Pa.

—**Bata Shoe Co.**, Belcamp, Md. $12,534,754. 1,434,094 pairs of tropical combat boots. Defense Personnel Support Center, Philadelphia, Pa.

—**Albert Turner & Co.**, New York, N.Y. $2,756,400. 120,000 men's polyester wool/tropical coats. Defense Personnel Support Center, Philadelphia, Pa.

—**Robert Hall Clothes**, Brooklyn, N.Y. $1,641,750. 75,000 men's polyester/wool tropical coats. Defense Personnel Support Center, Philadelphia, Pa.

—**Waterbury Button Co.**, Waterbury, Conn. $1,957,909. 20,902,032 gold-plated insignia buttons. Defense Personnel Support Center, Philadelphia, Pa.

—**International Harvester Co.**, Melrose Park, Ill. $1,630,731. Diesel engine tractors, spare parts and service. Defense Construction Supply Center, Columbus, Ohio.

29—**Alpha Industries**, Knoxville, Tenn. $1,380,618. 195,555 men's nylon and cotton sateen field coats with hoods. Defense Personnel Support Center, Philadelphia, Pa.

—**Cleveland Woolens**, Cleveland, Tenn. $1,120,599. 300,000 yards of wool cloth. Defense Personnel Support Center, Philadelphia, Pa.

30—**Endicott-Johnson**, Endicott, N.Y. $3,146,458. 460,596 pairs of men's oxford dress shoes. Defense Personnel Support Center, Philadelphia, Pa.

—**International Shoe Co.**, St. Louis, Mo. $2,070,000. 300,000 pairs of men's oxford dress shoes. Defense Personnel Support Center, Philadelphia, Pa.

—**Sportwelt Shoe Co.**, Nashua, N.H. $2,047,202. 300,000 pairs of men's oxford dress shoes. Defense Personnel Support Center, Philadelphia, Pa.

—**Genesco, Inc.**, Nashville, Tenn. $1,374,990. 200,000 pairs of men's oxford dress shoes. Defense Personnel Support Center, Philadelphia, Pa.

ARMY

1—**FMC Corp.**, San Jose, Calif. $2,033,710. 105mm projectiles. Santa Clara, Calif. Picatinny Arsenal, Dover, N.J.

—**Lockheed Aircraft**, Sunnyvale, Calif. $1,235,791. Equipment and services in connection with underground testing at the Nevada Test Site. Defense Atomic Support Agency, Washington, D.C.

—**Valley Construction Co.**, Columbus, Miss. $1,081,172. Construction of an ammunition facility at Anniston Army Depot, Ala. Engineer Dist., Mobile, Ala.

—**Standard Products**, Cleveland, Ohio. $3,233,808. Rubber track shoe assemblies for M13 personnel carriers. Tank Automotive Command, Warren, Mich.

—**AVCO Corp.**, Stratford, Conn. $4,672,800. P55–L–11 engines for medium transport helicopters. $4,025,000. Special tooling to support production of T55–L–11 engines. Aviation Materiel Command, St. Louis, Mo.

—**Southern Airways of Tex.**, Fort Wolters, Tex. $23,041,908. Helicopter pilot training and maintenance of aircraft and related equipment. Purchasing and Contracting Office, Fort Wolters, Tex.

—**Imodco, Inc.**, Los Angeles, Calif. $1,268,371. Furnishing and installing a floating oil terminal. Engineer Dist., San Francisco, Calif.

2—**United Aircraft**, East Hartford, Conn. $7,020,000. T73–P–1 engines for CH–54A helicopters. Aviation Materiel Command, St. Louis, Mo.

—**Boeing Co.**, Morton, Pa. $9,607,000. Blade assemblies for CH–47 helicopters. Aviation Materiel Command, St. Louis, Mo.

—**Bell Helicopter Co.**, Fort Worth, Tex. $38,076,348. AH–1G helicopters. Aviation Materiel Command, St. Louis, Mo.

—**Lockheed Aircraft**, Sunnyvale, Calif. $1,304,903. Equipment and services in connection with underground nuclear testing at the Nevada Test Site. Seattle, Wash., Sunnyvale, Calif., and the Nevada Test Site. Defense Atomic Support Agency.

—**General Electric**, Syracuse, N.Y. $2,635,000. Van-mounted digital computer for use in automating data collection and data reduction in support of war games field experimentation. Electronics Command, Fort Monmouth, N.J.

5—Lockheed Aircraft, Sunnyvale, Calif. $1,-275,230. Equipment and services in connection with underground nuclear testing at the Nevada Test Site. Seattle, Wash., Sunnyvale, Calif., and the Nevada Test Site. Defense Atomic Support Agency.

—White Motor Corp., Lansing, Mich. $9,-844,869. 2½-ton trucks. General Purpose Vehicle Project Manager, Warren, Mich.

6—Standard Container, Inc., Montclair, N.J. $1,434,162. Boxes for small caliber ammunition. Homerville, Ga. Frankford Arsenal, Philadelphia, Pa.

—Lawless & Alford, Inc., Austin, Tex. $8,-242,389. Construction of seven enlisted men's barracks complexes at Fort Hood, Tex. Engineer Dist., Fort Worth, Tex.

—Burns, Kirkly & Williams Construction Co., Auburn, Ala. $1,250,983. Construction of a five-story, 120-man BOQ at Fort Rucker, Ala. Engineer Dist., Mobile, Ala.

—Hercules Engines, Canton, Ohio. $1,297,449. 14-horsepower gasoline engines. Canton. Mobility Command, St. Louis, Mo.

7—Motor Wheel Corp., Lansing, Mich. $1,057,-103. Tires for self-propelled artillery guns. Tank Automotive Command, Warren, Mich.

—Anderson Construction Co., Holton, Kan. $1,495,777. Work on the Pine Creek Dam and Reservoir Project. Near Valiant, Okla. Engineer Dist., Tulsa, Okla.

—United Ammunition Container, Inc., Philadelphia, Pa. $1,077,250. Fiber containers for ammunition. Atlanta, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—RABR-KIEF, Inc., and B-E-C-K Constructors, Seattle, Wash. $1,243,100. Construction of a base chapel, NCO open mess, weather facility, and extension of existing taxiway lighting system at Shemya Air Force Station, Alaska; and for construction of a heated automotive storage building at Adak Air Force Station, Alaska. Engineer Dist., Anchorage, Alaska.

—King - Paola, Inc., Kalispell, Mont. $4,809,-287. Work on the Libby Dam, Libby, Mont. Engineer Dist., Seattle, Wash.

—Chrysler Corp., Center Line, Mich. $4,689,-454. Engineering services in support of heavy tracked combat vehicles. Tank Automotive Command, Warren, Mich.

—Zenith Radio Corp., Chicago, Ill. $1,253,-385. Fuzes for 2.75-inch rockets. Harry Diamond Laboratories, Washington, D.C.

—Mason & Hanger—Silas Mason & Co., Lexington, Ky. $2,788,724. Loading, assembling and packing of miscellaneous medium-caliber ammunition and components. Burlington, Iowa. Ammunition Procurement & Supply Agency, Joliet, Ill.

8—Link Belt Speeder Co., Cedar Rapids, Iowa $1,478,805. 122 self-powered diesel hammers (8,000-lb. capacity) and 14 self-powered diesel hammers (18,000-lb. capacity). Mobility Equipment Command, St. Louis, Mo.

—Sargent-Fletcher Co., El Monte, Calif. $1,716,965. Spray tanks. Edgewood Arsenal, Md.

—Eureka Williams Co., Bloomington, Ill. $1,513,365. Metal parts for 750-lb. bombs. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Garsite Products, Deer Park, N.Y. $1,030,-110. Miscellaneous components for bridges. Mobility Equipment Command, St. Louis, Mo.

9—Atlas Chemical Industries, Wilmington, Del. $6,235,850. TNT. Chattanooga, Tenn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—General Motors, Indianapolis, Ind. $1,622,-180. Transmission assemblies for rebuilt M48 and M60 tanks. Indianapolis. Tank Automotive Command, Warren, Mich.

—Braund, Inc., Anchorage, Alaska. $3,-516,256. Construction work at Clear Air Force Station, Alaska. Engineer Dist., Anchorage, Alaska.

—Infrared Industries, Carpinteria, Calif. $1,-629,230. Telescopes for sighting units in M102-towed howitzers. Frankford Arsenal, Philadelphia, Pa.

—Atlantic Research Corp., Alexandria, Va. $3,669,000. Mines. West Hanover, Mass. Ammunition Procurement & Supply Agency, Joliet, Ill.

12—Continental Motors, Muskegon, Mich. $2,-925,674. Engine cylinder assemblies for M60 tanks. Tank Automotive Command, Warren, Mich.

—Mason & Hanger, Silas Mason & Co., Lexington, Ky. $4,240,398. 500-lb. bombs. Grand Island, Neb. Ammunition Procurement & Supply Agency, Joliet Ill.

—Harvey Aluminum Sales, Torrance, Calif. $5,424,171. Classified ammunition items. Milan, Tenn. Ammunition Procurement & Supply Agency, Joliet Ill.

—General Motors, Detroit, Mich. $1,592,557. Diesel engines, with containers, for 175mm self-propelled guns; eight-inch self-propelled howitzers; and recovery vehicles. Tank Automotive Command, Warren, Mich.

—Whirlpool Corp., Evansville, Ind. $2,059,-693. 105mm projectiles. Picatinny Arsenal, Dover, N.J.

—Polan Industries, Huntington, W. Va. $1,-072,156. Truck-mounted mine detecting sets. Mobility Equipment Command, St. Louis, Mo.

—Collins Radio Co., Dallas, Tex. $1,899,765. Modification kits to expand the capability of tactical radio communications sets. Electronic Command, Philadelphia, Pa.

—General Electric, Burlington, Vt. $3,750,-894. Self-propelled, anti-aircraft artillery weapons systems. Army Weapons Command, Rock Island, Ill.

13—System Development Corp., Santa Monica, Calif. $2,835,350. Advanced development on a prototype data management system. Defense Supply Service, Washington, D.C.

—Theisen Bros., Inc., Osmond, Neb. $1,502,-584. Work on the Local Flood Protection Project, Norfolk, Neb. Engineer, Dist., Omaha, Neb.

—Thermal Construction Corp., Wood-Ridge, N.J. $14,227,000. Construction of 10 barracks complexes to house 3,260 enlisted men. Fort Dix, N.J. Engineer Dist., New York, N.Y.

—Algernon Blair, Inc., Montgomery, Ala. $11,624,000. Construction of 10 barracks complexes. Fort Jackson, S.C. Engineer Dist., Savannah, Ga.

—General Electric, Burlington, Vt. $4,727,-358. 7.62mm aircraft machine guns, support equipment and spare parts. Army Weapons Command, Rock Island, Ill.

14—General Time Corp., La Salle, Ill. $5,664,-316. Time fuzes for 4.2-inch motars and 105mm illuminating shells. Peru, Ill. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Sperry Rand Corp., New York, N.Y. $4,-678,929. Manufacturing, loading, assembling and packing of miscellaneous ammunition. Shreveport, La. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Day & Zimmerman, Inc., Philadelphia, Pa. $3,865,225. Loading, assembling and packing of miscellaneous components for medium caliber ammunition, Texarkana, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Kisco Co., St. Louis Mo. $2,049,494. 105mm cartridge cases. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Chamberlain Mfg. Corp., Waterloo, Iowa. $12,407,100. 105mm cartridge cases. Burlington, N.J. Ammunition Procurement & Supply Agency, Joliet, Ill.

—FMC Corp., Charleston, W. Va., $3,700,000. Retrofit and reinspection of armored recovery vehicles (M578). Tank Automotive Command, Warren, Mich.

—Dixie Contractors, Inc., Memphis, Tenn. $2,032,334. Work on Lock and Dam No. 17 of the Arkansas River and Tributaries Project. Wagoner County, Okla. Engineer Dist., Tulsa, Okla.

—Green Construction Co. and Winston Bros. Co., Des Moines, Iowa. $8,817,939. Work on the Beltzville Dam and Reservoir Project, Lehighton, Pa. Engineer Dist., Philadelphia, Pa.

—Continental Motors, Muskegon, Mich. $10,-313,235. Engine assemblies for 5-ton trucks. Tank Automotive Command, Warren, Mich.

—Bowen-McLaughlin-York, York, Pa. $3,-221,156. Retrofit of M48A3 tanks. Army Weapons Command, Rock Island, Ill.

—Kaiser Jeep Corp., Toledo, Ohio. $43,784,-654. 5-ton trucks. General Purpose Vehicles Project Manager, Warren, Mich.

—United Aircraft, Stratford, Conn. $3,712,-789. Rotary wings and transmission assemblies for CH-54A helicopters. Aviation Materiel Command, St. Louis, Mo.

—A. S. Schulman Electric Co., Los Angeles, Calif. $3,106,651. Work on the Lower Monumental lock and dam project. Near Pasco, Wash. Engineer Dist., Seattle, Wash.

15—Continental Motors, Muskegon, Mich. $1,-979,276. Military standard engines. Milwaukee, Wis. Mobility Command, St. Louis, Mo.

—Martin Marietta, Orlando, Fla. $5,818,578. Shillelagh missiles. Orlando. Army Missile Command, Huntsville, Ala.

—Uneco, Inc., Bellevue, Neb. $1,768,469. Delay plunger, M1 for the M48A3 fuze. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Southwest Truck Body Co., St. Louis, Mo. $3,467,800. XM750 semi-trailer, repair parts storage van 6-ton, 2 wheel. West Plains, Mo. Tank Automotive Command, Warren, Mich.

—Heil, Co., Milwaukee, Wis. $1,458,222. M131A5D semi-trailer, tank, aircraft fuel servicing. Tank Automotive Command, Warren, Mich.

—Canadian Commercial Corp., Ottawa, Canada. $2,266,046. Aircraft engines. Longueuil, Quebec, Canada. Aviation Materiel Command, St. Louis, Mo.

—M. Sloane Mfg. Co., Chelsea, Mass. $1,117,-200. Cotton cleaning-swab packs. Procurement Detachment, Chicago, Ill.

—Remington Arms Co., Bridgeport, Conn. $1,893,234. Cartridges, 38. cal., special ball, M41. Frankford Arsenal, Philadelphia, Pa.

16—Collins Radio Co., Richardson, Tex. $2,200,-000. Modification kits for radio terminal sets. Procurement Detachment, Chicago Ill.

—Firestone Tire & Rubber Co., Akron, Ohio $1,634,400. Track shoes assemblies for M4[illegible] and M60 tanks. Noblesville, Ind. Tank Automotive Command, Warren, Mich.

—Honeywell, Inc., Hopkins, Minn. $1,202,-089. Bomb dispensers. New Brighton, Minn Ammunition Procurement & Supply Agency, Joliet, Ill.

—Arnold M. Diamond, Inc., Great Neck, N.Y $1,081,466. Construction of a central heating and refrigeration plant at Fort Jackson, S.C. Engineer Dist., Savannah, Ga.

—Valley Construction Co., Columbus, Miss $1,206,188. Construction of an addition to an existing boiler plant, construction of two enlisted men's barracks and one enlisted men's mess at Fort Campbell, Ky Engineer Dist., Mobile Ala.

—Ashbach Construction Co., St. Paul, Minn $3,184,858. Flood protection work on the White Clay Creek Project. Atchison, Kan Engineer Dist., Kansas City, Kan.

—Highland Industries, Kansas City, Mo. $3,-383,072. Truck-mounted liquid dispensing units. Mobility Equipment Command, St Louis, Mo.

19—Dynamics Corp. of America, Bridgeport Conn. $1.202,775. 60-cycle generator sets Mobility Equipment Command, St. Louis Mo.

—Chrysler Corp., Highland Park, Mich. $3,-351,616. Fork lift trucks. Warren, Mich Mobility Equipment Command, St. Louis Mo.

—Anthony Co., Streator, Ill. $4,240,872. Fork lift trucks. Mobility Equipment Command St. Louis, Mo.

—Sperry Rand Corp., Salt Lake City, Utah $1,100,000. FY 1968 engineering services for the Sergeant missile system. Army Missile Command, Huntsville, Ala.

—Lear Siegler, Inc., South Gate, Calif. $1,-887,038. Shipping and storage container for 20mm cartridges. Frankford Arsenal Philadelphia, Pa.

—General Electric, Burlington, Vt. $3,201,-982. $2,937,600. 7.62mm aircraft machine guns, armament pods and related equipment. Army Weapons Command, Rock Island, Ill.

—MacLeod Co., Cincinnati, Ohio. $1,082,90[illegible] Truck-mounted water distributor tanks Mobility Equipment Command, St. Louis Mo.

—Gibbs Mfg. & Research Corp., Janesville Wis. $1,047,707. Metal parts for 2.75-inch rocket fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill.

—LTV Aerospace Corp., Warren, Mich. $1[illegible] 973,198. Ground support equipment for the Lance missile system. Army Missile Command, Warren, Mich.

—Seaboard Construction Co., Brunswick, G[illegible] $1,717,069. Construction of an airfield facility, POL facilities and a prefabricate[illegible] sewage treatment plant at Fort Stewart Ga. Engineer Dist., Savannah, Ga.

20—Bell Aerospace Corp., Fort Worth, Te[illegible] $4,990,350. UH-1D helicopters. Aviation Materiel Command, St. Louis, Mo.

—General Motors, Detroit, Mich. $2,284,7[illegible] Diesel engines for M113 vehicles. Ta[illegible] Automotive Command, Warren, Mich.

—General Motors, Cleveland, Ohio. $19,212,-760. 155mm self-propelled howitzers. Army Weapons Command, Rock Island, Ill.
—Henry A. Knott, Inc., Baltimore, Md. $2,-290,900. Construction of a one-story laboratory building and a one-story toxic storage building at Edgewood Arsenal, Md. Engineer Dist., Baltimore, Md.
—Norris Industries, Inc., Everett, Mass. $2,-515,238. 66mm rocket launchers (M72). Ammunition Procurement & Supply Agency, Joliet, Ill.
21—Forsberg & Gregory, Redlands, Calif. $2,-149,643. Construction of five 3-story barracks buildings and alterations to the base operations maintenance dock and hanger facilities at Norton AFB, Calif. Engineer Dist., Los Angeles, Calif.
—Craig Systems Corp., Lawrence, Mass. $1,-364,406. Shelters for electrical equipment. Lawrence. Electronics Command, Philadelphia, Pa.
—Ford Motors, Birmingham, Mich. $7,707,-171. ¼-ton utility trucks. Highland Park, Mich. General Purpose Vehicle Project Manager, Warren, Mich.
—R. C. Can Co., Hazelwood, Mo. $1,263,209. Fiber containers for ammunition. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Great Lakes Dredge & Dock Co., Cleveland, Ohio. $1,786,116. Work on the Ashtabula, Ohio, Harbor Project. Engineer Dist., Buffalo, N.Y.
—Strick Corp., Fairless Hills, Pa. $11,634,-148. 12-ton stake semi-trailers. Chicago, Ill. Tank Automotive Command, Warren, Mich.
22—Canadian Commercial Corp., Ottawa, Canada. $3,156,900. Production of TNT. Beloiel, Quebec. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Pace Corp., Memphis, Tenn. $6,251,653. Ground illuminating signals and parachute illuminating signals. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Hayes International Corp., Birmingham, Ala. $1,588,000. Metal parts for 2.75-inch rockets. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Bell Helicopter Co., Fort Worth, Tex. $8,-941,076. TH-13T helicopter basic instrument trainers and related data. Aviation Materiel Command, St. Louis, Mo.
—AVCO Corp., Stratford, Conn. $1,646,890. 1967 production improvement program for T-55 engines. Aviation Materiel Command, St. Louis, Mo.
—Servo Corp. of America, Hicksville, N.Y. $2,811,793. Receiving sets. Electronics Command, Philadelphia, Pa.
—Raytheon Co., Burlington, Mass. $1,020,-019. Repair part kits for communication facilities. Hawthorne, Calif. Electronics Command, Philadelphia, Pa.
—Western Electric, New York, N.Y. $4,219,-500. Overhaul of three Nike Hercules systems. Burlington, N.C. Army Missile Command, Huntsville, Ala.
—J. W. Bateson Co., Dallas, Tex. $7,846,697. Construction of eight classroom buildings and support utilities at Fort Gordon, Ga. Engineer Dist., Savannah, Ga.
23—Joseph L. Pohl Contractor, Nevada, Mo. $1,389,831. Work on the Stockton, Mo., Dam and Reservoir. Engineer Dist., Kansas City, Mo.
—National Presto, Inc., Eau Claire, Wis. $12,360,947. Metal parts for 105mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.
—National Union Electric, Corp., Bloomington, Ill. $2,008,515. Bomb fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Northrop Caroline, Inc., Asheville, N. C. $1,302,000. Chemicals. Swannanoa, N.C. Edgewood Arsenal, Md.
—Lockheed Electronics Co., Plainfield, N.J. $2,160,000. Radar sets. Metuchen, N.J. Frankford Arsenal, Philadelphia, Pa.
—SCM Corp., Deerfield, Ill. $2,301,268. Teletypewriter sets. Electronics Command, Philadelphia, Pa.
—IBM Corp., El Paso, Tex. $1,358,102. Automatic data processing equipment. White Sands Missile Range, N.M. Electronics Command, Philadelphia, Pa.
—Raytheon Co., Norwood, Mass. $1,581,181. Telephone signal equipment. Electronics Command, Philadelphia, Pa.
—FMC Corp., Charleston, W. Va. $12,237,400. M113 armored personnel carriers, mortar carriers, command post carriers, control test items and repair items. Tank Automotive Command, Warren, Mich.
—Bell Aerospace Corp., Fort Worth, Tex. $1,571,790. OH-13S helicopters. Aviation Materiel Command, St. Louis, Mo.
—Chrysler Corp., Highland Park, Mich. $2,-025,174. Cupola modification kits and cupola adapter vision ring kits. Scranton, Pa. and Warren, Mich. Army Weapons Command, Rock Island, Ill.
—Hughes Aircraft, Fullerton, Calif. $2,139,-167. Radio sets, receiver, transmitters and spare parts. Southwest Procurement Detachment, Pasadena, Calif.
—Allison Steel Mfg. Co., Phoenix, Ariz. $3,-270,072. Saddle assemblies. Mobility Equipment Command, St. Louis, Mo.
—Arvol D. Hays Construction Co., Lubbock, Tex $1,615,630. Construction of on-base facilities for expanded aviation training at Fort Wolters, Tex. Engineer Dist., Fort Worth, Tex.
—R. A. Heintz Construction Co., and Willamette Western Corp., Portland, Ore. $8,-664,974. Work on the Libby, Mont., Dam Project. Engineer Dist., Seattle, Wash.
—Wilkenson Mfg. Co., Fort Calhoun, Neb. $1,140,750. Fin assemblies for 60mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.
—E. G&G, Inc., Albuquerque, N.M. $1,500,-000. Equipment and services in connection with underground nuclear testing at the Nevada Test Site. Defense Atomic Support Agency, Washington, D.C.
—Case-Master Body, Inc., Rose City, Mich. $6,864,633. Two-wheel water tank trailers. Tank Automotive Command, Warren, Mich.
—Ross Aviation, Inc., Tulsa, Okla. $4,032,-847. Fixed-wing, primary and instrument training, and rotary-wing basic instrument flight training. Fort Rucker, Ala. and Fort Stewart, Ga. Purchasing & Contracting Office, Fort Rucker, Ala.
26—Hercules, Inc., Wilmington, Del. $10,221,-181. Rocket propellant and operation and maintenance activities. Lawrence, Kan. Ammunition Procurement & Supply Agency, Joliet, Ill.
—General Electric, Burlington, Vt. $13,639,-900. XM163 weapons systems. Army Weapons Command, Rock Island, Ill.
—Fairchild Camera & Instrument Co., Syosset, N.Y. $6,086,500. M514A1 artillery fuzes. Harry Diamond Laboratories, Washington, D.C.
—Texas Instrument Co., Dallas, Tex. $6,100,-600. M514A1 artillery fuzes. Harry Diamond Laboratories, Washington, D.C.
—Raytheon Co., Bristol, Tenn. $6,100,600. M514A1 artillery fuzes. Harry Diamond Laboratories, Washington, D.C.
—Engelhard Hanovia, Inc., Newark, N.J. $1,782,144. Lamp assemblies for Xenon searchlights. Electronics Command, Fort Monmouth, N.J.
—Honeywell, Inc., Tampa, Fla. $10,000,000. Classified electronics equipment. Electronics Command, Fort Monmouth, N.J.
—General Electric, Red Bank, N.J. $1,074,-558. Tool and test equipment and ancillary items for attitude heading reference sets. West Lynn, Mass. Electronics Command, Fort Monmouth, N.J.
—Rodgers Hydraulic, Inc., Minneapolis, Minn. $1,139,000. Various hydraulic presses. Granite Falls, Minn. Mobility Equipment Command, St. Louis, Mo.
—Elliott Machine Works, Phoenix, Ariz. $1,-712,910. Trailer-mounted lubricating and servicing units. Galion, Ohio and Phoenix. Mobility Equipment Command, St. Louis, Mo.
—Stanford Research Institute, Menlo Park, Calif. $1,092,000. Classified work. Army Research Office, Durham, N.C.
—Aerojet General, Sacramento, Calif. $1,-287,900. XM22E8 Hawk rocket motors. Northwest Procurement Agency, Oakland, Calif.
—Ampex Corp., Redwood City, Calif. $1,357,-480. Educational TV technical terminal facilities, programs and control tests for 12 US CONARC Training Centers. Purchasing and Contracting Office, Fort Monroe, Va.
27—Sperry Rand Corp., Phoenix, Ariz. $3,088,-800. Gyromagnetic compass sets and ancillary items. Electronics Command, Fort Monmouth, N.J.
—Varo, Inc., Garland, Tex. $1,485,107. Night vision weapons. Electronics Command, Fort Monmouth, N.J.
—M.I.T., Cambridge, Mass. $1,275,000. Basic applied research work in the fields of general physics, plasma dynamics, communication sciences and engineering. Electronics Command, Fort Monmouth, N.J.
—Raytheon, Co., Norwood, Mass. $2,569,400. Multiplexers (telephone or telegraph terminals housed in shelters). North Dighton, Mass. Electronics Command, Fort Monmouth, N.J.
—Collins Radio, Co., Dallas, Tex. $3,750,000. Radio terminal sets and regular part kits. Electronics Command, Philadelphia, Pa.
—General Dynamics, Pomona, Calif. $1,784,-064. Engineering services for the Redeye missile. Army Missile Command, Huntsville, Ala.
—Oberg Construction Co., Northridge, Calif. $2,124,000. Construction of a steel hanger with concrete lean-to and a small concrete apron at Edwards AFB, Calif. Engineer Dist., Los Angeles, Calif.
—Kaiser Jeep Corp., Toledo, Ohio. $30,429,-269. 1¼-ton cargo trucks and ambulances. General Purpose Vehicles Project Manager, Warren, Mich.
—D & A Equipment Co., Pensacola, Fla. $1,591,548. Construction of a two-story office building, aircraft maintenance facilities, a flammable storage and paint shop, a boiler plant, and supporting utilities at Fort Rucker, Ala. Engineer Dist., Mobile, Ala.
—Peter Kiewit Sons' Co., Vancouver, Wash. $1,033,207. Grading work in the Union Railroad Company area near Arlington, Ore. (part of John Day Lock and Dam Project). Engineer Dist., Walla Walla, Wash.
—Westinghouse Electric, Washington, D.C. $1,120,193. Design, fabrication and testing of 30 KW generator sets. Buffalo, N.Y. Engineer Research Laboratory, Fort Belvoir, Va.
—Stewart & Stevenson Services, Houston, Tex. $1,552,610. 45 KW multi-purpose generator sets. Mobility Equipment Command, St. Louis, Mo.
—Gichner Mobile Systems, Inc., Berkley Springs, W. Va. $1,498,948. Airmobile transporters. Aviation Materiel Command, St. Louis, Mo.
28—DeLong Corp., New York, N.Y. $3,200,000. Work on the Vung Ao and Vung Tau pier installations in Vietnam. Mobility Equipment Command, St. Louis, Mo.
—Gichner Mobile Systems, Berkley Springs, W. Va. $1,468,176. Portable, electric, tool outfits. Mobility Equipment Command, St. Louis, Mo.
—John R. Hollingsworth Co., Phoenixville, Pa. $1,148,343. 7½ KW generator sets. Mobility Equipment Command, St. Louis, Mo.
—American Pipe & Construction Co., Monterey Park, Calif. $2,209,387. Concrete pressure water pipe with fittings. Okinawa. Engineer Dist., Okinawa.
—Chamberlain Mfg. Corp., Waterloo, Iowa, $1,265,330. Metal parts for the 2.75-inch rocket. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Collins Radio Co., Richardson, Tex. $2,-444,739. Radio sets with repair part kits. Procurement Detachment, Chicago, Ill.
—Donaldson Co., Minneapolis, Minn. $1,628,-531. Exploratory and advanced development services to establish modularized collective protection for vehicles, vans and shelters. Edgewood Arsenal, Md.
—Raytheon Co., Lexington, Mass. $7,360,376. Initial production run of the self-propelled Hawk missile ground support equipment. Andover, Mass. and Bristol, Tenn. Army Missile Command, Huntsville, Ala.
—Raytheon Co., Lexington, Mass. $1,044,400. Production assurance engineering services for the Hawk missile system. Andover, Mass. Army Missile Command, Huntsville, Ala.
—Northrop Corp., Newbury Park, Calif. $1,-557,400. Target missile flight services for Project Charging Sparrow. Clark Field, Philippines. Army Missile Command, Huntsville, Ala.
—General Electric, Syracuse, N.Y. $6,158,810. Modification kits for high power acquisition radar and rotary joints used in connection with anti-jamming improvement on the Nike-Hercules system. Army Missile Command, Huntsville, Ala.
—General Electric, Springfield, Mass. $1,-900,000. Production and furnishing of 7.62mm machine guns. Army Weapons Command, Rock Island, Ill.
—Global Associates, Oakland, Calif. $3,759,-380. Logistics support at the Kwajalein Test Site, Marshall Islands. Nike X Project Office, Huntsville, Ala.

—Hughes Tool Co., Culver City, Calif. $13,644,312. Model TH55A primary trainer helicopters and related data. San Diego, Calif. Aviation Materiel Command, St. Louis, Mo.

—Continental Motors, Muskegon, Mich. $3,196,344. Production and ship equipment for the LDS series of engines for 2½-ton and 5-ton trucks, and M48 and M60 tanks. Tank Automotive Command, Warren, Mich.

—Southwest Truck Body Co., St. Louis, Mo. $1,298,150. M447 semi-trailers and M295A1 semi-trailer chassis. West Plains, Mo. Tank Automotive Command, Warren, Mich.

—Kaiser Jeep Corp., Toledo, Ohio. $3,150,073. Spare parts for trucks. Tank Automotive Command, Warren, Mich.

—Kaiser Jeep Corp., Toledo, Ohio. $5,754,175. M715 and M725 1¼-ton vehicles. General Purpose Vehicles Project Manager, Warren, Mich.

—Kaiser Jeep Corp., Toledo, Ohio. $1,457,486. M606 ¼-ton utility trucks. Tank Automotive Command, Warren, Mich.

—McCarthy Bros. Construction Co., St. Louis, Mo. $1,486,366. Work on the St. Louis Flood Protection Project. Engineer Dist., St. Louis, Mo.

—M.M. Sundt, Tuscon, Ariz. $1,387,450. Construction of a one-story addition for 20 beds plus alterations to an existing hospital at Davis Monthan AFB, Ariz. Engineer Dist., Los Angeles, Calif.

—Missouri Research Labs, St. Chaires, Mo. $1,082,909. Air mobile shelters. Aviation Materiel Command, St. Louis, Mo.

—Photo-Sonics, Inc., Burbank, Calif. $1,443,830. Versatile tracking mounts with binocular scopes. White Sands Missile Range, N.M.

—Northrop Corp., Anaheim, Calif. $1,142,801. 106mm projectiles. Picatinny Arsenal, Dover, N.J.

—Varian Associates, Beverly, Mass. $1,592,120. Electron tubes for radar sets. Electronics Command, Philadelphia, Pa.

—VIZ Mfg. Co., Philadelphia, Pa. $1,868,465. Radiosonde sets. Electronics Command, Philadelphia, Pa.

—Western Electric, New York, N.Y. $2,362,479. Additional Nike X planning effort. Burlington, N.C. and Allentown, Pa. Nike X Project Office, Huntsville, Ala.

29—Mack Truck, Inc., Allentown, Pa. $1,305,302. Transmission assemblies for 10-ton trucks. Hagerstown, Md. Tank Automotive Command, Warren, Mich.

—Mack Truck, Inc., Allentown, Pa. $4,884,316. Axle assemblies for 10-ton trucks. Tank Automotive Command, Warren, Mich.

—Cummins Engine Co. $3,890,621. Diesel engines with accessories for 10-ton trucks. Tank Automotive Command, Warren, Mich.

—Consolidated Diesel Electric Co., Old Greenwich, Conn. $19,115,838. Ten-ton trucks. Old Greenwich, Conn; Scotia, N.Y.; Schenectady, N.Y.; and Toms River, N.J. Tank Automotive Command, Warren, Mich.

—Chrysler Motors, Warren, Mich. $3,556,078. One-ton cargo trucks and one-ton ambulances. Tank Automotive Command, Warren, Mich.

—White Motors, Lansing, Mich. $1,171,000. Production engineering for 2½-ton M44 and M600 trucks. Tank Automotive Command, Warren, Mich.

—Continental Aviation & Engineering Corp., Detroit, Mich. $2,339,400. Production engineering and inspection engineering for 2½- and 5-ton truck engines. Tank Automotive Command, Warren, Mich.

—International Harvester Co., Chicago, Ill. $2,313,871. Trucks. Bridgeport, Conn. Tank Automotive Command, Warren, Mich.

—Ford Motors, Dearborn, Mich. $1,638,600. Production engineering services for M151-A1 and M718 trucks. Tank Automotive Command, Warren, Mich.

—Bowen-McLaughlin-York, York, Pa. $1,260,007. XM501E3 guided missile loaders and transporters. Bair, Pa. Tank Automotive Command, Warren, Mich.

—Aerojet General, Downey, Calif. $1,548,624. Bomb dispensers. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Norris Industries, Los Angeles, Calif. $2,255,230. 105mm cartridge cases. Riverbank, Calif. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Atlantic Research Corp., Alexandria, Va. $3,740,000. Classified munitions. West Hanover, Mass. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Atlantic Research Corp., Alexandria, Va. $8,750,000. Classified munitions. Hingham, Mass. Ammunition Procurement & Supply Agency, Joliet, Ill.

—General Motors, Detroit, Mich. $1,283,000. Reactivation, repair, and utilities in support of 105mm, M1 projectile metal parts. St. Louis, Mo. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Chamberlain Corp., Waterloo, Iowa. $6,703,060. Metal parts for 175mm projectiles. Scranton, Pa. Ammunition Procurement & Supply Agency, Joliet, Ill.

—U.S. Rubber Co., New York, N.Y. $2,759,585. Various explosives and reactivation of loading, assembling and packing units. Joliet, Ill. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Olin Mathieson Chemical Corp., East Alton, Ill. $6,651,199. Small arms propellant. Baraboo, Wis. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Appalachian Power Co., New York, N.Y. $2,900,000. Electrical power at the Army Ammunition Plant, Radford, Va. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Raytheon Co., Bedford, Mass. $2,900,000. Advanced development of SAM-D. Army Missile Command, Huntsville, Ala.

—Raytheon Co., Lexington, Mass. $3,750,839. Installation of modification kits for the Hawk missile system. Army Missile Command, Huntsville, Ala.

—Raytheon Co., Andover, Mass. $6,947,759. Line items of ground support equipment and field maintenance equipment for the Hawk missile system. Andover, Mass. and Waltham, Mass. Army Missile Command, Huntsville, Ala.

—Hol-Gar Mfg. Co., Primos, Pa. $1,967,366. 1.5KW generator sets. Mobility Equipment Command, St. Louis, Mo.

—Firestone Tire & Rubber Co., Akron, Ohio. $1,066,130. Petroleum tanks. Magnolia, Ark. Mobility Equipment Command, St. Louis, Mo.

—Uniroyal, Mishawaka, Wis. $1,097,540. Petroleum tanks. Warsaw, Ind. Mobility Equipment Command, St. Louis, Mo.

—General Motors, Kokomo, Ind. $1,997,147. Radio transmitters and receivers. Electronics Command, Philadelphia, Pa.

—Memcor, Inc., Huntington, Ind. $3,123,108. Radio receivers and receiver/transmitters. Electronics Command, Philadelphia, Pa.

—Mine Safety Appliance Co., Pittsburgh, Pa. $2,241,700. Field protective masks. Esmond, R.I. Edgewood Arsenal, Md.

—Honeywell, Inc., Tampa, Fla. $1,500,000. Classified research and development. Electronics Command, Fort Monmouth, N.J.

—Chicago Aerial Industries, Inc., Barrington, Ill. $2,156,000. Cameras, camera components and equipment. Electronics Command, Fort Monmouth, N.J.

—Caterpillar Tractor Co., Peoria, Ill. $2,183,606. Tractors. Kansas City, Mo. Engineer Research and Development Laboratories, Fort Belvoir, Va.

—H. Halvorson, Inc., Spokane, Wash. $1,339,500. Construction of a Federal Regional Center. Bothell, Wash. Engineer Dist., Seattle, Wash.

—Hawthorne Aviation, Fort Rucker, Ala. $2,175,201. Aircraft maintenance services and related test support of the Army Aviation Test Board. Aberdeen Proving Grounds, Md.

—Maremont Corp., Saco, Maine. $2,580,252. Barrel assemblies for 7.62mm machine guns. Procurement Detachment, New York, N.Y.

—M.M. Sundt Corp., Tuscon, Ariz. $1,072,479. Construction of an Aerobee 350 launch facility at White Sands Missile Range, N.M. Engineer Dist., Albuquerque, N.M.

—Potashnick Dredging, Inc., Fort Lauderdale, Fla. $2,616,190. Work on the Savannah, Ga., Harbor Project. Engineer Dist., Savannah, Ga.

—Bermite Powder Co., Saugus, Calif. $1,914,655. Various fuzes. Harry Diamond Laboratory, Washington, D.C.

—Philco Ford Corp., Newport Beach, Calif. $2,568,335. 40mm grenade launchers. Anaheim, Calif. Southwest Procurement Agency, Pasadena, Calif.

—Aerojet General, Azusa, Calif. $1,173,900. Design and fabrication of forward looking infrared airborne target acquisition and fire control system. Frankford Arsenal, Philadelphia, Pa.

—Great Lakes Dredging & Dock Co., New York, N.Y. $14,280,000. Work on the Providence River and Harbor, R.I. New England Div., Corps of Engineers, Waltham, Mass.

—Bethlehem Steel Corp., Bethlehem, Pa. $1,779,649. Forgings for 175mm guns. Watervliet Arsenal, N.Y.

—Thiokol Chemical Corp., Brunswick, Ga. $1,002,000. Tear gas. Edgewood Arsenal, Md.

30—ACF Industries, St. Louis, Mo. $1,587,134. Fuzes. Olivette, Mo. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Aerojet General, Downey, Calif. $1,831,800. Metal parts for 2.75-inch rockets. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Remington Arms Co., Bridgeport, Conn. $22,452,920. Miscellaneous small arms ammunition. Independence, Mo. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Chamberlain Mfg. Co., Waterloo, Iowa. $2,972,240. Metal parts for 155mm projectiles. Scranton, Pa. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Chamberlain Mfg. Co., Scranton, Pa. $1,515,755. Repairs in support of the 155mm, M107 program; the 155mm, M121A1 program and modernization in support of the 175mm, M437 program. Ammunition Procurement & Supply Agency, Joliet, Ill.

—E. I. DuPont Nemours & Co., Wilmington, Del. $2,726,076. TNT. Barksdale, Wis. Ammunition Procurement & Supply Agency, Joliet, Ill.

—General Motors, Detroit, Mich. $2,476,273. Metal parts for 105mm projectiles. St. Louis, Mo. Ammunition Procurement & Supply Agency, Joliet, Ill.

—National Presto Industries, Eau Claire, Wis. $11,084,635. Metal parts for 105mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Ingraham Co., Bristol, Conn. $1,812,774. Metal parts assembly of M125A1 boosters. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Zenith Radio Corp., Chicago, Ill. $1,630,206. Metal parts for rocket fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Bulova Watch Co., Jackson Heights, N.Y. $1,152,804. Metal parts for fuzes and arming mechanisms for fuzes. Valley Steam, N.Y. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Columbus Mil Par Mfg. Co., Columbus, Ohio. $2,810,467. Metal parts for fuzes. Westerville, Ohio. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Thiokol Chemical Corp., Bristol, Pa. $8,637,068. Rocket motors and miscellaneous items. Marshall, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Hercules, Inc., Wilmington, Del. $8,653,717. Various propellants, artillery and guided missile items. Radford, Va. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Sperry Rand Corp., New York, N.Y., $8,126,630. Loading, assembling and packing medium caliber and large caliber ammunition. Shreveport, La. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Olin Mathieson Chemical Corp., New York, N.Y. $5,348,949. Loading, assembling and packing miscellaneous propellants. Charleston, Ind. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Sylvania Electronics Products, Mountain View, Calif. $1,500,000. Classified electronics equipment. Santa Cruz, Calif. Electronics Command, Fort Monmouth, N.J.

—Minnesota Mining & Mfg. Co., Camarillo, Calif. $2,800,000. Classified electronics equipment. Electronics Command, Fort Monmouth, N.J.

—Stromberg Carlson Corp., Rochester, N.Y. $8,155,781. Fabrication of nine tandum switching centers to be installed at sites in Southeast Asia. Electronics Command, Fort Monmouth, N.J.

—Sperry Rand Corp., Great Neck, N.Y. $1,007,420. Designing and planning for fabrication of an exploratory development model electronic scanning pencil beam antenna and related data items. Electronics Command, Fort Monmouth, N.J.

—Sperry Rand Corp., Phoenix, Ariz. $1,196,969. Automatic flight control systems and electro-mechanic rotary actuators. Electronics Command, Fort Monmouth, N.J.

—Canadian Commercial, Ottawa, Canada, $1,448,054. Test facilities and maintenance support kits for radio sets. Montreal, Canada. Electronics Command, Fort Monmouth, N.J.

—HRB Singer, Inc., Morrestown, N.J. $4,055,880. Radio set transmitters, infrared

detecting sets and maintenance floats to support the AN/AAS-14. Electronics Command, Fort Monmouth, N.J.
—R. T. Communications, Rochester, N.Y. $1,680,000. Transportable radio sets. Electronics Command, Fort Monmouth, N.J.
—Stelma, Inc., Stamford, Conn. $1,276,001. Automated technical control system. Electronics Command, Fort Monmouth, N.J.
—Collins Radio Co., Cedar Rapids, Iowa. $2,012,158. Direction finder sets and major components. Electronics Command, Fort Monmouth, N.J.
—Machlett Laboratories, Stamford, Conn. $5,398,043. 25mm image intensifier assemblies. Electronics Command, Fort Monmouth, N.J.
—VARO, Inc., Garland, Tex. $1,639,400. Xenon searchlights. Electronics Command, Fort Monmouth, N.J.
—Hoffman Electronics Corp., El Monte, Calif. $3,500,000. Airborne radio sets. Electronics Command, Fort Monmouth, N.J.
—Page Communications Engineers, Inc., Washington, D.C. $2,000,000. Work on a classified project, Southeast Asia. Electronics Command, Fort Monmouth, N.J.
Machlett Laboratories, Stamford, Conn. $1,657,300. Miniaturized AN/PVS-3 miniscope. Electronics Command, Fort Monmouth, N.J.
Continental Motors, Muskegon, Mich. $2,838,020, $2,180,101. Five-ton truck engines. Tank Automotive Command, Warren, Mich.
General Motors, Indianapolis, Ind. $2,907,920. M109 transmissions and related parts. 1,325,405. Transmissions for the M113A1 family of vehicles. Tank Automotive Command, Warren, Mich.
—Stevens Mfg. Co., Ebensburg, Pa. $2,722,760. 1½-ton cargo trailers. Tank Automotive Command, Warren, Mich.
Johnson Corp., Bellevue, Ohio. $13,159,604. 1½-ton cargo trailers. Tank Automotive Command, Warren, Mich.
Mack Trucks, Allentown, Pa. $1,398,360. Spare diesel engines for 5-ton trucks. Hagerstown, Md. Tank Automotive Command, Warren, Mich.
Continental Motors, Muskegon, Mich. $2,578,309, $2,691,409. Five-ton truck engines. Tank Automotive Command, Warren, Mich.
Cane Master Body, Inc., Rose City, Mich. $8,520,627. ¾-ton cargo trailers. Holland, Mich. Tank Automotive Command, Warren, Mich.
FMC Corp., San Jose, Calif. $1,671,305. Metal parts assemblies for XM694E1 projectiles, Santa Clara, Calif. Picatinny Arsenal, Dover, N.J.
—Whirlpool Corp., Evansville, Ind. $1,015,682. 90mm projectiles. $3,572,950. 90mm canister assemblies. Picatinny Arsenal, Dover, N.J.
Northrop Corp., Anaheim, Calif. $1,150,442. 90mm projectiles. Picatinny Arsenal, Dover, N.J.
Norris Industries, Vernon, Calif. $4,261,530. Metal parts for 162mm projectiles. Picatinny Arsenal, Dover, N.J.
Muncie Gear Works, Muncie, Ind. $1,164,810. Fin and nozzle assemblies for 2.75 inch rockets. Picatinny Arsenal, Dover, N.J.
—AVCO Corp., Stratford, Conn. $1,772,699. Impeller assemblies for T53 engines for UH1 aircraft. Aviation Materiel Command, St. Louis, Mo.
—Bell Aerospace Corp., Fort Worth, Tex. $2,000,000. Revision in the delivery schedule of UH1D helicopters. Aviation Materiel Command, St. Louis, Mo.
—AVCO Corp., Stratford, Conn. $2,949,000. Particle separators for T53 engines. Charleston, S.C. Aviation Materiel Command, St. Louis, Mo.
—Bell Helicopter Co., Fort Worth, Tex. $1,633,858. Adjustment in the work scope on the UH-1 helicopter. Aviation Materiel Command, St. Louis, Mo.
—Bell Aerospace Corp., Fort Worth, Tex. $4,623,800, $2,788,840. Rotor blades for UH-1 helicopters. Aviation Materiel Command, St. Louis, Mo.
—General Motors, Cleveland, Ohio. $1,086,309. Vehicle engineering services. Army Weapons Command, Rock Island, Ill.
—Chrysler Corp., Detroit, Mich. $17,385,290. Tanks, combat engineer vehicles and chassis for M60A1 tanks. Dayton, Ohio; Detroit and Centerline, Mich.; Huntsville, Ala.; and Scranton, Pa. Army Weapons Command, Rock Island, Ill.
—Colt's Inc., Hartford, Conn. $4,500,000. License to use technical data and patents pertaining to 5.56mm M16, M16A1, XM177 and XM177E2 rifles. Army Weapons Command, Rock Island, Ill.
Martin & Gass, Inc., Merryfield, Va. $2,258,342. Demolition and construction necessary to expand burial areas at the National Cemetery, Arlington, Va. Engineer Dist., Norfolk, Va.
Oman Construction Co., Nashville, Tenn. $1,303,227. Clearing timber and preparing the foundation abutments and portal areas for construction of the Gathright Dam, Covington, Va. Engineer Dist., Norfolk, Va.
Williams Paving Co., Norfolk, Va. $1,346,610. Clearing timber, and excavation, grading and construction work for the New Market Creek area in Hampton and Newport News, Va. Engineer Dist., Norfolk, Va.
Kaiser Jeep Corp., Toledo, Ohio. $12,443,026, $12,633,446. Five-ton trucks. South Bend, Ind. General Purpose Vehicle Project Manager, Warren, Mich.
Continental Motors, Muskegon, Mich. $1,507,786. ¼-ton truck engine assemblies. General Purpose Vehicle Project Manager, Warren, Mich.
Fairchild Camera & Instrument Corp., Syosset, N.Y. $2,016,000. Still picture cameras and test sets. Electronics Command, Philadelphia, Pa.
Arvin Industries, Inc., Columbus, Ind. $1,469,946. Direction finder sets. Electronics Command, Philadelphia, Pa.
Raytheon, Co., North Dighton, Mass. $2,360,000. Electronic equipment. Electronics Command, Philadelphia, Pa.
URS Corp., San Mateo, Calif. $3,721,082. Continued development of an ADP system. Fort Hood, Tex. Engineer Research Laboratories, Fort Belvoir, Va.
Battelle Memorial Institute, Columbus, Ohio. $1,102,000. Work on a classified project. Defense Supply Service.
FMC Corp., San Jose, Calif. $1,586,740. Support of production for the M113A1, M106A1, M125A1, M177A1, XM741, and all Vulcan Air Defense family of vehicles. Northwest Procurement Agency, Oakland, Calif.
Santa Fe Engineers, Inc., and Stolte, Inc., DBA S&S Constructors, Lancaster, Calif. $2,797,000. Construction of space launch complex 2W, packages 3 and 4 (for support facilities), and a fire station, at Vandenberg AFB, Calif. Engineer Dist., Los Angeles, Calif.
Page Aircraft Maintenance, Inc., Lawton, Okla. $5,571,776. Performance of field and organizational aircraft maintenance on fixed and rotary wing aircraft. Fort Rucker, Ala. and Fort Stewart, Ga. Purchasing and Contracting Office, Fort Rucker, Ala.
Federal Laboratories, Inc., Saltsburg, Pa. $1,012,660. Hand grenades. Edgewood Arsenal, Md.
Greenhut Construction Co., Pensacola, Fla. $1,115,547. Construction of a one-story technical library building and a two-story data service facility building with basement at Eglin AFB, Fla. Engineer Dist., Mobile, Ala.
Hensel Phelps Construction Co., Greeley, Colo. $11,721,000. Construction of 10 enlisted men's barracks complexes at Fort Riley, Kan. Engineer Dist., Kansas City, Mo.
Hi-Voltage Engineering Corp., Burlington, Mass. $1,782,000. Erection of shielding for tandem Van De Graff accelerators. Edgewood, Md. Edgewood Arsenal, Md.
Cessna Aircraft, Wichita, Kan. $1,433,705. Dispensers for bomblets. Procurement Detachment, Chicago, Ill.
Copperweld Steel Co., Glassport, Pa. $5,671,280. Manufacturing and furnishing noncorrosive copper coated steel wire fabric for use in production of articulated concrete mattresses for use on the Mississippi River and Tributaries Flood Control Channel Improvement project. Engineer Dist., Memphis, Tenn.
S. S. Mullen, Inc., and Dravo Corp., Seattle, Wash. $7,084,400. Construction of access and construction facilities for the Snettisham Dam hydropower project in Alaska. Engineer Dist., Anchorage, Alaska.
—Hushman Construction Co., St. Joseph, Mo. $2,229,072. Construction of Phase II of a concrete spillway for the Oologah Dam and Reservoir, Okla. Engineer Dist., Tulsa, Okla.
—N. R. Hamm Contractor, Inc., Perry, Kan. $2,034,433. Flood protection work Section 1. North Lawrence, Kan. Engineer Dist., Kansas City, Mo.
—Magnavox Co., Urbana, Ill. $2,879,609. M18 direction computer guns. Frankford Arsenal, Philadelphia, Pa.
—General Time Corp., Skokie, Ill. $2,916,170. XM711 fuzes. Frankford Arsenal, Philadelphia, Pa.
—Systems Development Corp., Santa Monica, Calif. $1,293,977. A systems training program for the Army Air Defense Missile Mentor and the Birdie Air Defense Control and Coordination System. Army Missile Command, Huntsville, Ala.
—Northrop, Corp., Anaheim, Calif. $2,202,012. Hawk launchers. Army Missile Command, Huntsville, Ala.
—Wyatt and Kippers Engineers, Inc., and Burgess Construction Co., Seattle, Wash. $1,320,121. Construction of a primary power generation at Eielson AFB, Alaska. Engineer Dist., Anchorage, Alaska.
—J. A. Guy, Inc., Dublin, Ohio. $1,779,300. Construction of a toxic laboratory addition and for alterations with appurtenant utilities at Wright-Patterson AFB, Ohio. Engineer Dist., Louisville, Ky.
—Brown & Root, Inc., Houston, Tex. $2,372,413. Construction of the Sabin Lake South spoil disposal area for the Sabin-Neches Waterway, Port Arthur, Tex. Engineer Dist., Galveston, Tex.
—Automatic Electric Co., North Lake, Ill. $1,494,750. Line items of various telephone central office equipment. Electronic Proving Ground, Fort Huachuca, Ariz.
—Booz-Allen Applied Research, Chicago, Ill. $1,710,527. Continuation of studies being performed by the Combined Army Research Office, Fort Leavenworth, Kan. Southwest Procurement Agency, Pasadena, Calif.
Studebaker Corp., Minneapolis, Minn. $2,918,322. Various generator sets. Engineer Research and Development Laboratory, Fort Belvoir, Va.
—Allis Chalmers Mfg. Co., Milwaukee, Wis. $1,528,113. Engine generator sets and overpack sets. Harvey, Ill. Engineer Research and Development Laboratory, Fort Belvoir, Va.
—Kaiser Aluminum & Chemical Sales, Inc., Oakland, Calif. $21,372,000. Manufacture of aluminum honeycomb core sandwich-type airplane landing mat material. Engineer Waterways Experiment Station, Vicksburg, Miss.
—Dow Chemical Co., Midland, Mich. $5,775,000. Manufacture of MX-18 extruded aluminum airplane material. Madison, Ill. Engineer Waterways Experiment Station, Vicksburg, Miss.
—Hercules, Inc., Wilmington, Del. $26,038,755. Miscellaneous propellants. Lawrence, Kan. Ammunition Procurement & Supply Agency, Joliet, Ill.
—R.C.A., Camden, N.J. $3,000,000 Classified repairs parts. Electronics Command, Fort Monmouth, N.J.
—DeWeese Construction Co., Covina, Calif. $1,011,217. Construction of an addition to an existing hospital at Edwards AFB, Calif. Engineer Dist., Los Angeles, Calif.
White Motors, Lansing, Mich. $18,296,767. 2½-ton trucks. General Purpose Vehicles Project Manager, Warren, Mich.
—Mason & Hanger, Silas Mason Co., Lexington, Ky. $4,396,741. Loading, assembling, and packing bombs, and for facilities for manufacture of eight-inch, M106 shells. Grand Island, Neb. Ammunition Procurement & Supply Agency, Joliet, Ill.
Olin Mathieson Chemical Corp., East Alton, Ill. $4,128,411. Miscellaneous propellants. Baraboo, Wis. Ammunition Procurement & Supply Agency, Joliet, Ill.
—U.S. Rubber Co., New York, N.Y. $4,880,231. Explosives. Joliet, Ill. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Day & Zimmermann, Inc. $9,023,759. Miscellaneous explosive items. Texarkana, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Southern Airways Co., Atlanta, Ga. $1,912,553. Metal parts for 155mm M107 projectiles. Sylacauga, Ala. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Chamberlain Mfg. Co., Waterloo, Iowa. $4,470,484. Metal parts for 155mm M107 projectiles. Scranton, Pa. Ammunition Procurement & Supply Agency, Joliet, Ill.
—Ravenna Arsenal, Inc., Akron, Ohio. $1,410,674. Conversion of 90mm high explosive cartridges to 90mm high explosive antitank cartridges. Ravenna, Ohio.

Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Hercules, Inc.**, Wilmington, Del. $5,032,315. Miscellaneous propellants, and design and operation of TNT facilities. Radford, Va. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Remington Arms Co.**, Bridgeport, Conn. $9,364,748. Miscellaneous small arms ammunition. Independence, Mo. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Thiokol Chemical Corp.**, Bristol, Pa. $1,652,264. Various items of ammunition including loading, assembling and packing 105mm, 60mm, and 4.2-inch cartridges. Marshall, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Holston Defense Corp.**, Kingsport, Tenn. $9,129,266. Production of explosives. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Sperry Rand Corp.**, New York, N.Y. $2,421,838. Loading, assembling and packing miscellaneous medium caliber items of ammunition. Shreveport, La. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Mason & Hanger, Silas Mason Co.**, New York, N.Y. $6,908,808. Loading, assembling and packing miscellaneous artillery ammunition and aerial mines. Burlington, Iowa. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Remington Arms Co.**, Bridgeport, Conn. $1,987,323. Manufacture of miscellaneous small arms ammunition. Independence, Mo. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Hercules, Inc.**, Wilmington, Del. $1,475,008. Propellants. Radford, Va. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Sperry Rand Corp.**, New York, N.Y. $1,259,018. Load, assemble and pack ammunition. Shreveport, La. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Applied Devices Corp.**, College Point, N.Y. $1,304,412. Surveying instruments. Mobility Equipment Command, St. Louis, Mo.

—**AVCO Corp.**, Stratford, Conn. $2,084,015. Turbine nozzles for T53 engines. Aviation Materiel Command, St. Louis, Mo.

—**Boyertown Auto Body Works**, Boyertown, Pa. $3,318,958. Six-ton semi-trailers. Tank Automotive Command, Warren, Mich.

—**Hanson Machinery Co.**, Tiffin, Ohio. $4,336,866. Five-ton cranes. Mobility Equipment Command, St. Louis, Mo.

—**Christie Electric Corp.**, Los Angeles, Calif. $1,068,454. A transformer to provide power for various portable radios while in a stationary situation where commercial or AC power is available. Electronics Command, Fort Monmouth, N.J.

—**Philco-Ford Corp.**, Philadelphia, Pa. $3,000,000. Maintenance and operation services in connection with the Integrated Wide Band Communications System in Thailand. Electronics Command, Fort Monmouth, N.J.

—**Page Communications Engineers**, Washington, D.C. $3,950,000. Maintenance and operation services in connection with the Integrated Wide Band Communications Systems in South Vietnam. Electronics Command, Fort Monmouth, N.J.

—**Rand Corp.**, Santa Monica, Calif. $1,717,850. A classified study. Defense Supply Service, Washington, D.C.

NAVY

1—**Boeing Co.**, Morton, Pa. $30,511,640. CH-46D helicopters. Naval Air Systems Command.

—**Lockheed Aircraft**, Burbank, Calif. $10,662,636. SP-2H aircraft. Naval Air Systems Command.

—**United Aircraft**, East Hartford, Conn. $4,000,000. Phase II development of TF-30-P-12 engines. Naval Air Systems Command.

—**Pacific Coast Engineering Co.**, Alameda, Calif. $3,705,550. Construction of six cargo craft. Naval Ship Systems Command.

—**Marinette Marine Corp.**, Marinette, Wis. $3,450,625. Construction of five harbor tug boats. Naval Ship Systems Command.

—**Martin Marietta**, Baltimore, Md. $1,881,086. Classified work on Navy aircraft. Naval Air Systems Command.

—**Electric Storage Battery Co.**, Philadelphia, Pa., $1,341,937. Submarine storage battery elements and cells. Naval Ship Systems Command.

—**Pacific Coast Engineering Co.**, Alameda, Calif. $1,096,000. Construction of an aluminum landing craft, utility (LCU). Naval Ship Systems Command.

2—**Lockheed Aircraft**, Burbank, Calif. $11,190,543. Support of FY 1967 procurement of P-3B aircraft. Naval Air Systems Command.

—**General Dynamics**, Pomona, Calif. $3,500,000. Production of medium range Standard missiles. Naval Ordnance Systems Command.

—**Maxson Electronic Corp.**, Macon, Ga. $1,116,318. Detonating fuses for 8-inch, 55-caliber projectiles. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**Sanders Associates, Inc.**, Nashua, N.H. $1,170,656. Sonobuoys. Naval Air Systems Command.

5—**Grumman Aircraft Engineering Corp.**, Bethpage, N.Y. $2,700,000. FY 68 procurement of A-6A aircraft. Naval Air Systems Command.

—**LTV Aerospace Corp.**, Dallas, Tex. $2,656,000. Production of A-7D aircraft. Naval Air Systems Command.

—**Corbetta Construction Co.**, Des Plaines, Ill. $2,173,000. Construction of staff barracks and Wave barracks at the Great Lakes Naval Training Center. Midwest Div., Naval Facilities Engineering Command, Great Lakes, Ill.

—**Hickok Electrical Instrument Co.**, Cleveland, Ohio. $1,780,816. Oscilloscopes. Naval Ship Systems Command.

—**John C. Long, Inc.**, Chicago, Ill. $1,702,405. Construction of a technical training building at the Great Lakes Naval Training Center. Midwest Div., Naval Facilities Engineering Command, Great Lakes, Ill.

—**Todd Shipyards**, San Pedro, Calif. $1,520,000. Regular overhaul of the oiler USS Caliente (AO-53). Supervisor of Shipbuilding, Eleventh Naval Dist., San Diego, Calif.

—**Honeywell, Inc.**, Seattle, Wash. $1,300,000. Ceramic transducers for the Mark 37 torpedo improvement plan. Naval Ordnance Station, Forest Park, Ill.

—**Akwa-Downey Construction Co.**, Milwaukee, Wis. $1,375,000. Construction of headquarters and maintenance facilities at Camp Pendleton, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif.

—**Coneen Construction Corp.**, El Cajon, Calif. $1,227,000. Construction of personnel support facilities in the Horno Area, Camp Pendleton, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif.

—**Horne Bros., Inc.**, Newport News, Va. $1,192,258. Regular overhaul of the transport USS Fremont (APA 44). Supervisor of Shipbuilding, Fifth Naval Dist., Norfolk, Va.

6—**Grumman Aircraft Engineering Corp.**, Bethpage, N.Y. $10,400,000. Research and development on EA-6B aircraft. Naval Air Systems Command.

—**Garrett Corp.**, Phoenix, Ariz. $1,199,086. Air turbine starters and spare components. Naval Air Systems Command.

7—**Eastman Kodak Co.**, Rochester, N.Y. $5,157,994. Fuzes for ammunition. Navy Ships Part Control Center, Mechanicsburg, Pa.

—**Dickman Construction Co.**, Mountain View, Calif. $4,212,000. Construction of 200 family housing units at the Naval Air Station, Moffett Field, Calif. Naval Facilities Engineering Command.

—**Union Carbide, Corp.**, New York, N.Y. $2,157,878. Components for ammunition for three-inch and five-inch guns. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**Kilgore Corp.**, Toone, Tenn. $1,107,802. Aircraft float lights. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**Sperry Rand Corp.**, Syosset, N. Y. $1,690,000. Electronic test equipment for use in testing equipment and subsystems of ship inertial navigation systems. Naval Ship Systems Command.

—**Litton Systems**, Woodland Hills, Calif. $1,547,900. Spare parts for use on A-6A aircraft. Aviation Supply Office, Philadelphia, Pa.

—**United Aircraft**. $1,436,780. Propellor systems for P-3B aircraft. Aviation Supply Office, Philadelphia, Pa.

—**Alliance Webbing, Inc.**, New York, N.Y. $1,375,848. Tape assemblies used in arresting gear aboard aircraft carriers. Central Falls, R. I. Naval Air Engineering Center, Philadelphia, Pa.

8—**Kaman Aircraft**, Bloomfield, Conn. $2,908,296. Additional funding for conversion of UH-2A/B helicopters to twin engine configuration designated UH-2C. Naval Air Systems Command.

—**R.C.A.**, Moorestown, N. J. $2,042,700 Radar pulse doppler modification spar[e] parts. Naval Air Systems Command.

—**Sippican Corp.**, Marion, Mass. $1,986,991 Expendable bathythermographs, recorder[s] and launchers for use in oceanographi[c] survey projects. Naval Ship Systems Command.

—**Texas Instruments**, Dallas, Tex. $1,978,528 Guidance and control sections and win[g] and fin sets for Shrike missiles. Naval Ai[r] Systems Command.

—**Westinghouse Electric**, Baltimore, Md. $1,000,000. Production of prototype models o[f] special exercise sections of MK 48 torpedoes. Naval Ordnance Systems Command

—**Magnavox Corp.**, Fort Wayne, Ind. $1,163,687. Sonobuoys. Naval Air Systems Command.

9—**United Aircraft**, Hartford, Conn. $15,782,481. J52-P8A engines. Naval Air System[s] Command.

—**Magnavox Co.**, Fort Wayne, Ind. $6,885,447. Modification kits for airborne rada[r] sets. Naval Air Systems Command.

—**Collins Radio Co.**, Richardson, Tex. $6,773,723. Airborne communications systems an[d] related equipment. Naval Air System[s] Command.

—**Northrop Corp.**, Newbury Park, Calif. $4,288,800. MQM-74A target drones. Nava[l] Air Systems Command.

—**Sanders Associates**, Nashua, N.H. $4,218,097. Electronic equipment. Naval Ai[r] Systems Command.

—**Garrett Corp.**, Los Angeles, Calif. $2,334,737. Compression power units an[d] related equipment. Naval Air System[s] Command.

—**Douglas Aircraft**, Long Beach, Calif. $1,850,158. Bomb racks and adapter kit sets Torrance, Calif. Naval Air Systems Command.

—**Sylvania Electric Products**, Waltham, Mass $1,540,000. Airborne receiver-transmitte[r] radio sets. Naval Air Systems Command

—**Garrett Corp.**, Phoenix, Ariz. $1,376,815 P-3A and P-3B aircraft. Naval Air Systems Command.

—**Garrett Corp.**, Phoenix, Ariz. $1,056,939 T76-G10 engines. Naval Air System[s] Command.

—**EDO Corp.**, College Point, N.Y. $1,088,253 Retrofit kits for installation on sona[r] equipment aboard naval ships. Naval Shi[p] Systems Command.

—**Pioneer Aerodynamics Systems**, Manchester, Conn. $1,078,000. Parachute an[d] container assemblies for MK 24 parachut[e] flares, Columbia, Miss. Naval Ammunitio[n] Depot, Crane, Ind.

—**M. Steinthal and Co.**, New York, N.Y. $1,081,920. Parachute and container assemblies for M24 parachute flares. Roxboro N.C. Navy Ammunition Depot, Crane, Ind

—**Columbus Milpar & Mfg. Co.**, Columbus Ohio. $6,474,774. Fin assemblies for 500 lb. bombs, Columbus. Navy Ships Part[s] Control Center, Mechanicsburg, Pa.

12—**McDonnell Co.**, St. Louis, Mo. $50,000,000 F-4E aircraft. Naval Air Systems Command.

—**Centex Construction Co.**, Dallas, Tex. $4,027,357. 350 family housing units at th[e] Naval Air Station, Corpus Christi, Tex Gulf Div., Naval Facilities Engineerin[g] Command, New Orleans, La.

—**Philco-Ford Corp.**, Palo Alto, Calif. $4,999,000. Marine tactical data syste[m] equipment, associated support items an[d] technical data. Naval Ship Systems Command.

—**Raytheon Co.**, Sudbury, Mass. $2,806,551 Alteration kits for guidance system electronics assemblies for Polaris missile[s] Waltham, Mass. Special Projects Office.

—**U. S. Steel Corp.**, Pittsburgh, Pa. $1,648,462. Bomb bodies for 250-lb. bomb[s] McKeesport, Pa. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**Arthus D. Little, Inc.**, Cambridge, Mas[s] $1,430,947. Various technical studies an[d] analysis for the Sonar Systems Offic[e] Naval Ship Systems Command.

—**Magnavox Co.**, Fort Wayne, Ind. $1,176,160. Design review, development, fabrication and test of preproduction models [o]f an electronic countermeasure syste[m] Naval Air System Command.

—**Otis Elevator Co.**, Stamford, Conn. $1,010,532. Analyzer indicators for shipboa[rd] installation, engineering services, optic[s] for repair parts, and associated technic[al] data. Naval Ship Systems Command.

13—**Grumman Aircraft Engineering Cor[p.]**

Bethpage, N.Y. $15,234,000. TC-4C aircraft. Naval Air Systems Command.

—General Precision, Inc., Glendale, Calif. $3,500,000. Modification kits for fire control systems for MK 48 torpedoes. Naval Ordnance Systems Command.

—ITT Gilfillan, Inc., Los Angeles, Calif. $1,693,069. Radar sets, transmitters, indicator units and related accessories. Naval Ship Systems Command.

—Houdaille Duval Wright Co., Jacksonville, Fla. $1,073,200. Construction of an aircraft parking apron and taxiway at the Naval Air Station, Jacksonville, Fla. Southeast Div., Naval Facilities Engineering Command, Charleston, S.C.

14—Teledyne Systems, Hawthorne, Calif. $14,434,185. Self-contained navigation systems. Naval Air Systems Command.

—North American Aviation. $10,921,286. Conversion of A-5A aircraft to RA-5C configuration. Naval Air Systems Command.

—PRD Electronics, Westbury, N.Y. $5,925,000. Versatile avionics shop test systems and support equipment. Naval Air Systems Command.

—Ling-Temco-Vought, Inc., Greenville, Tex. $1,747,280. Modification of EC-121K aircraft. Naval Air Systems Command.

—United Aircraft, Stratford, Conn. $1,300,000. S-61R helicopters for the Air Force. Naval Air Systems Command.

—Sundstrand Corp., Rockford, Ill. $1,351,180. Constant speed drive kits for A-7A aircraft. Naval Air Systems Command.

—Sanders Associates, Nashua, N.H. $1,753,274. Electronic equipment. Naval Air Systems Command.

—Honeywell, Inc., Hopkins, Minn. $2,622,944. Ignition assemblies for ASROC. Saugus, Calif. Naval Ordnance Systems Command.

—Poloron Products, New Rochelle, N.Y. $2,590,595. Bomb fin assemblies for MK 82 bombs. Scranton, Pa. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—Metals Engineering Corp., Greeneville, Tenn. $1,892,814. Bomb fin assemblies. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—West Bend Co., West Bend, Wis. $1,274,100. Cartridge tanks for storing ammunition. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—Treadwell Corp., New York, N.Y. $1,008,469. Repair of Government furnished oxygen generators and procurement of long lead time equipment in connection with repair effort. Naval Ship Systems Command.

—Smith & Sapp Construction Co., Orlando, Fla. $1,579,443. Construction of a 4,600-man mess hall at the Naval Training Center, Orlando, Fla. Southeast Div., Naval Facilities Engineering Command, Charleston, S.C.

15—Stromberg Carlson Corp., San Diego, Calif. $2,164,800. Airborne tactical data display systems for ASW aircraft. Naval Air Systems Command.

—Lear Siegler, Inc., Grand Rapids, Mich. $2,100,236. Loft bomb computer system components. Naval Air Systems Command.

—Northeast Construction Co., Parkersburg, W. Va. $1,277,150. Construction of support facilities at the Naval Radio Station, Sugar Grove, W. Va. Chesapeake Div., Naval Facilities Engineering Command, Washington, D.C.

16—Lear Siegler, Inc., Grand Rapids, Mich. $5,998,200. Airborne attitude heading reference systems. Naval Air Systems Command.

—United Aircraft, East Hartford, Conn. $2,669,121. Spare parts for A-7B aircraft. Navy Aviation Supply Office, Philadelphia, Pa.

—D. K. Chavis, Inc., Pensacola, Fla. $2,056,500. Construction of bachelor officers' quarters at the Naval Air Station, Pensacola, Fla. Southeast Div., Naval Facilities Engineering Command, Charleston, S. C.

—Alliance Webbing, Inc., New York, N.Y. $1,376,000. 11-inch nylon tape used in the arrestment of aircraft aboard aircraft carriers. Central Falls, R.I. Naval Air Engineering Center, Philadelphia, Pa.

—Sparton Corp., Jackson, Mich. $1,868,000. Bathythermograph transmitter sets. Naval Air Systems Command.

—EPSCO, Inc., Westwood, Mass. $1,482,922. Signal generators and related data used to check-out electronics equipment. Naval Ship Systems Command.

—Westinghouse Electric, Washington, D.C. $1,200,000. Rotors for service turbine generator sets aboard submarines. Sunnyvale, Calif. Naval Ship Systems Command.

19—LTV Aerospace Corp., Dallas, Tex. $17,070,017. Services and materials for improvements to extend service life of F-8D aircraft. Naval Air Systems Command.

—Alsco, Inc., St. Louis, Mo. $8,421,186. Rocket launchers. Naval Air Systems Command.

—Johns Hopkins University, Silver Spring, Md. $5,678,905. Research and development on the Bumblebee project. Naval Ordnance Systems Command.

20—Westinghouse Electric, Baltimore, Md. $70,552,520. Airborne radar sets. Naval Air Systems Command.

—Grumman Aircraft Engineering Corp., Bethpage, N.Y. A-6A aircraft. Naval Air Systems Command.

—General Time Corp., Stamford, Conn. $8,926,805. Fuzes for 5-inch projectiles. Peru, Ill. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—United Aircraft, East Hartford, Conn. $2,471,093. Spare parts for A-7B aircraft. Navy Aviation Supply Office, Philadelphia, Pa.

—Melpar, Inc., Falls Church, Va. $2,292,010. Airborne radar homing and warning sets. Naval Air Systems Command.

—Kaman Aircraft, Bloomfield, Conn. $1,600,000. Main rotor blades for UH-2A, B, and C helicopters. Navy Aviation Supply Office, Philadelphia, Pa.

—Sanders Associates, Inc., Nashua, N.H. $1,260,000. Continued basic engineering and development of an air droppable ASW sonobuoy system. Naval Air Systems Command.

—Vitro Corp. of America, Silver Spring, Md. $1,216,308. Engineering and supporting services for Terrier, Tartar and Talos missiles. Naval Ordnance Systems Command.

21—Honeywell, Inc., North Hopkins, Minn. $22,655,644. Production of Mark 46 torpedoes. Naval Ordnance Systems Command.

—Curtiss Wright Corp., Wood-Ridge, N.J. $6,689,481. Spare parts to support several types of aircraft. Navy Aviation Supply Office, Philadelphia, Pa.

—Universal Aircraft Services, Inc., Inkster, Mich. $3,339,200. Terminal and ground support services for Quicktrans air carrier operations. Navy Purchasing Office, Washington, D.C.

—Chesapeake Instrument Corp., Shadyside, Md. $2,430,025. Classified supplies and services for sonar equipment aboard nuclear powered fleet ballistic missile submarines. Navy Ship Systems Command.

—Willamette Iron & Steel Co., Portland, Ore. $2,282,858. Activation and overhaul of the fleet minesweepers USS Speed and USS Dextrous. Supervisor of Shipbuilding, 13th Naval Dist., Seattle, Wash.

—Firestone Tire & Rubber Co., Akron, Ohio. $1,223,456. 15-man lifeboats. Magnolia, Ark. Navy Ships Parts Control Center, Mechanicsburg, Pa.

22—United Aircraft, Stratford, Conn. $5,971,200. SH-3D helicopters. Naval Air Systems Command.

—LTV Aerospace Corp., Dallas, Tex. $10,143,843. A-7D aircraft. Naval Air Systems Command.

—PRD Electronics, Westbury, N.Y. $4,740,000. Versatile Avionics Shop Test systems and associated equipment. Naval Air Systems Command.

—General Electric, Utica, N.Y. $2,996,647. Airborne data processing systems. Naval Air Systems Command.

—AVCO Corp., Stratford, Conn. $2,536,400. Constant speed drives for Navy aircraft. Naval Air Systems Command.

—Grumman Aircraft Engineer Corp., Bethpage, N.Y. $1,935,000. Retrofit of government-owned milling machines. Naval Air Systems Command.

—General Precision, Clifton, N.J. $1,753,564. Airborne navigational computer sets. Naval Air Systems Command.

—General Electric, Binghampton, N.Y. $1,527,581. Automatic flight control systems and related equipment. Naval Air Systems Command.

—Sparton Corp., Jackson, Mich. $1,494,400. Bathythermograph transmitter sets. Naval Air Systems Command.

—McDonnell Douglas Corp., Long Beach, Calif. $1,080,207. Ducts and connection assemblies for A-3 aircraft. Navy Aviation Supply Office, Philadelphia, Pa.

—EFMC Corp., Los Angeles, Calif. $1,278,366. Weather shields for 5-inch/54 caliber gun mounts. Naval Ordnance Station, Louisville, Ky.

23—Raytheon Co., Portsmouth, R.I. $29,627,090. Submarine sonar sets. Naval Ship Systems Command.

—Akwa Downey Construction Co., Milwaukee, Wis. $5,327,042. Construction of recruit barracks at the Naval Training Center, Orlando, Fla. Southeast Div., Naval Facilities Engineering Command, Charleston, S.C.

—Sperry Piedmont Co., Charlottesville, Va. $4,209,544. Radar equipment for naval ships. Naval Ship Systems Command.

—General Dynamics, San Diego, Calif. $2,760,000. Tracking radar systems. Naval Air Systems Command.

—Northrop Corp., Norwood, Mass. $2,052,572. Manufacture and repair of inertial reference integrating gyroscopes. Special Projects Office.

—Martin-Marietta, Orlando, Fla. $1,772,394. Radio test sets, frequency comparators and command link test sets. Aviation Supply Office, Philadelphia, Pa.

—Jarbet Co., San Antonio, Tex. $1,426,500. Improvements to runways and taxiways at the Naval Auxiliary Air Station, Beeville, Tex. Gulf Div., Naval Facilities Engineering Command, New Orleans, La.

—Hydromatics, Inc., Bloomfield, N.J. $1,013,965. Ball valves used on nuclear submarines. Naval Supply Center, Oakland, Calif.

—Firestone Tire & Rubber Co., Akron, Ohio. $12,202,209. High-capacity, amphibious assault fuel systems. Magnolia, Ark.; Buffalo, N.Y.; Mansfield and Akron, Ohio. Marine Corps., Headquarters.

26—International Harvester, San Diego, Calif. $2,070,334. Auxiliary power plants for Navy helicopters. Naval Air Systems Command.

—Dubie-Clark Co., Toccoa, Ga. $4,115,232. Shipping and storage containers for Walleye missiles. Naval Air Systems Command.

—McDonnell-Douglas Corp., St. Louis, Mo. $2,813,146. Structural fatigue testing of Navy aircraft. Naval Air Systems Command.

—Grumman Aircraft Engineering Corp., Bethpage, N.Y. $14,000,000. Research and development on EA6B aircraft. Naval Air Systems Command.

—Sylvania Electronics Systems, Needham Heights, Mass. $1,783,923. A Research tool digital computer system. Naval Training Device Center, Orlando, Fla.

—General Precision, Binghampton, N.Y. $2,266,791. F-4D (IR) weapon system training set and support items. Palo Alto, Calif. Naval Training Device Center, Orlando, Fla.

—General Dynamics, Groton, Conn. $2,908,-

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Detection transmitting sets. Naval Air Systems Command.

—General Electric, Santa Barbara, Calif. $1,200,000. Research of Fleet Anti-Submarine Warfare data analyses. Office of Naval Research, Washington, D.C.

—G. L. Cory, Inc., San Diego, Calif. $3,971,368. Construction of a technical training building at the Naval Training Center, San Diego, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif.

28—Falcon Carriers, Inc., New York, N.Y. and Charles Kurz & Co., Philadelphia, Pa. $57,500,000 and $16,000,000 (respectively). Charter of five newly built tankers over a five year period beginning Dec. 31, 1969. Military Sea Transportation Service.

—Bell Aerosystems Co., Buffalo, N.Y. $5,558,770. Major equipment for the automatic carrier landing system. Wheatfield, N.Y. Naval Ship Systems Command.

—Polarad Electronics Corp., Long Island City, N.Y. $1,297,764. Radio frequency amplifier equipment and spare parts. Naval Ship Systems Command.

—Electronics Communications, Inc., St. Petersburg, Fla. $3,261,643. Communications equipment for the Marine Tactical Data System and in other field applications. Naval Ship Systems Command.

—General Electric, Syracuse, N.Y. $4,846,065. Mine detecting/classifying sonar sets. Naval Ship Systems Command.

—General Electric, Schenectady, N.Y. $5,047,628. Nuclear propulsion components. Naval Air Systems Command.

—Westinghouse Electric, Washington, D.C. $10,323,201. Production of main assembly and related equipment for the MK 45 Mod 1 torpedo. Baltimore, Md. Naval Ordnance Systems Command.

—ITT Federal Laboratories, Nutley, N.J. $1,214,985. Electronic countermeasure equipment. Naval Air Systems Command.

—Texas Instruments, Inc., Dallas, Tex. $1,049,384. Shrike missile guidance and control sections and sets of wings and fins. Naval Air Systems Command.

—E. W. Bliss Co., South Portland, Maine. $3,156,749. M21 arresting gear systems and spares used for shore base arresting of aircraft. Naval Air Engineering Center, Philadelphia, Pa.

—International Builders of Florida, Inc., Coral Gables, Fla. $2,989,000. Construction of two 900-man barracks at the Marine Corps Recruit Depot, Parris Island, S.C. Southeast Div., Naval Facilities Engineering Command, Charleston, S.C.

29—Lockheed Missiles & Space Co., Sunnyvale, Calif. $13,583,919. Tactical field services support for the Polaris missile program. Special Projects Office.

—M.I.T., Cambridge, Mass. $2,950,000. Additional multi-access computer study. Office of Naval Research.

—H. W. Stanfield Construction Corp., and S. L. Haehn, Inc., San Diego, Calif. $2,889,900. Construction of barracks at the Marine Corps Recruit Depot, San Diego, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif.

—Woods Hole Oceanographic Institution, Woods Hole, Mass. $2,476,500. Oceanographic studies. Office of Naval Research.

—Hercules, Inc., Wilmington, Del. $1,814,981. Nitrocellulose, a chemical used in propellant manufacture. Parlin, N.J. Naval Ordnance Station, Indian Head, Md.

—General Electric, Utica, N.Y. $1,160,000. Spare parts for E-2A aircraft radar sets. Navy Aviation Supply Office, Philadelphia, Pa.

—Raber-Kief, Inc., and B-E-C-K Constructors, Seattle, Wash. $1,096,000. Additions to power Plant #3, Naval Station, Adak, Alaska. Northwest Div., Naval Facilities Engineering Command, Seattle, Wash.

—Astro-Science Corp., South El Monte, Calif. $1,874,017. Acquisition of wind tunnel aerodynamic data on propeller performance. Naval Air Systems Command.

—Raytheon Co., Lexington, Mass. $4,500,000. Sparrow III guided missiles. Lowell, Mass. Naval Air Systems Command.

—United Aircraft, East Hartford, Conn. $5,560,000. Continued development of the TF-30-P-18 engine. Naval Air Systems Command.

—McDonnell Douglas Corp., St. Louis, Mo. $72,374,000. F-4J and F-4E aircraft. Naval Air Systems Command.

—Alsco, Inc., St. Louis, Mo. $6,736,940. Rocket launchers. Naval Air Systems Command.

—Magnavox Co., Fort Wayne, Ind. $1,000,000. Modification kits for airborne radar sets. Naval Air Systems Command.

—Yankee Walter Corp., Los Angeles, Calif. $1,013,207. Aircraft crash fire and rescue trucks. Naval Air Systems Command.

—Magnavox Co., Fort Wayne, Ind. $1,568,000. Detection transmitting sets. Naval Air Systems Command.

—ITT Federal Laboratories, San Fernando, Calif. $1,739,165. Radio navigation sets with ancillary items and services. Naval Ship Systems Command.

—R.C.A., Camden, N.J. $1,065,000. Radio sets, test equipment and associated technical data. Naval Ship Systems Command.

—Sylvania Electronics Systems, Williamsville, N.Y. $2,042,325. Classified communications equipment. Naval Ship Systems Command.

—Edo Corp., College Point, N.Y. $3,441,637. Long range detection and tracking sonar equipment. Naval Ship Systems Command.

—Loadcraft, Inc., Denton, Tex. $1,605,728. Air transportable vans with air conditioners for use in avionics maintenance facilities. Brady, Tex. and Bay Shore, N.Y. Headquarters, Marine Corps.

30—General Electric, Syracuse, N.Y. $5,763,532. Advanced developmental sonar sets for submarines. Naval Ship Systems Command.

—ITT Gilfillan, Inc., Los Angeles, Calif. $2,566,300. Modification kits for radar equipment used aboard ships. Naval Ship Systems Command.

—R.C.A., Camden, N.J. $2,130,000. Radio sets, modules and spare parts, and data items. Naval Ship Systems Command.

—Sperry Rand Corp., Charlottesville, Va. $1,648,290. Vehicle gyrocompasses. Naval Ship Systems Command.

—Hughes Aircraft. $1,545,388. Modification kits for radar equipment. Naval Ship Systems Command.

—ITT Federal Laboratories, Nutley, N.J. $1,126,000. Radio sets, repair parts and sundry data items for Marine Corps use. Naval Ship Systems Command.

—FMC Corp., San Jose, Calif. $1,250,000. Design, development and construction of two assault amphibian recovery vehicles and conversion of one LVTPX12 amphibian to a prototype assault command vehicle. Naval Ship Systems Command.

—Speciality Electronics Development Corp., Glendale, N.Y. $1,015,000. Radar switchboard equipment. Naval Ship Systems Command.

—Teledyne Corp., Berwick, La. $1,101,245. Eight 50-foot, twin-screw aluminum patrol launches and spare parts. Naval Ship Systems Command.

—LTV Aerospace Corp., Dallas, Tex. $62,628,000. A-7B aircraft. Naval Air Systems Command.

—North American Aviation, McGregor, Tex. $10,509,974. Sparrow and Shrike missile rocket motors. Naval Air Systems Command.

—McDonnell-Douglas Corp., St. Louis, Mo. $3,066,674. Bomb racks and adapter kit sets. Torrance, Calif. Naval Air Systems Command.

—Sperry Rand Corp., St. Paul, Minn. $2,200,000. Avionics computers. Naval Air Systems Command.

—Kaman Aircraft, Bloomfield, Conn. $1,407,203. Conversion of UH-2A/B helicopters to a twin engine configuration designated UH-2C. Naval Air Systems Command.

—Cessna Aircraft, Wichita, Kan. $1,037,400. Ejector pylon assemblies. Naval Air Systems Command.

—Symetrics Engineering Corp., Satellite Beach, Fla. $2,675,000. Fabricate, install and test telemetry antenna systems. Navy Purchasing Office, Los Angeles, Calif.

—Hughes Aircraft, Fullerton, Calif. $2,148,682. Design and fabrication of multi-mode sonar consoles and passive data memory units. Navy Purchasing Office, Los Angeles, Calif.

—Monitor Systems, Inc., Fort Washington, Pa. $1,614,916. Telemetry separations and display systems for use at the Pacific Missile Range, Point Mugu, Calif. Navy Purchasing Office, Los Angeles, Calif.

—FMC Corp., Minneapolis, Minn. $14,773,064. 5-inch/54 mod 9 gun mounts. Naval Ordnance Station, Louisville, Ky.

—Admiral Corp., Chicago, Ill. $5,547,995. AN/ARC-51 radio sets for use on various aircraft. Navy Aviation Supply Office, Philadelphia, Pa.

—General Electric, Washington, D.C. $4,630,000. Design and development of the Poseidon fire control and support equipment. Pittsfield, Mass. Special Projects Office.

—American Mfg. Co. of Tex., Fort Worth, Tex. $2,491,833. Mark 41, 5-inch, 54 caliber projectiles. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—John Hopkins University, Silver Spring, Md. $2,005,000. Talos missile research and development. Naval Ordnance Systems Command.

—Otis Elevator Co., Stamford, Conn. $1,967,182. 152mm gun launcher trainers. Naval Training Device Center, Orlando, Fla.

—A C Electronics, Goleta, Calif. $1,060,120. Production of synchronous clocks for the MK 46 and MK 48 torpedoes and associated programs, and related electronics. Naval Ordnance Systems Command.

AIR FORCE

1—Bendix Corp., Teterboro, N.J. $1,[illegible]. Aircraft electronic equipment and aerospace ground equipment. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Carnegie Institute of Technology, Pittsburgh, Pa. $1,717,000. Research in electronic information data processing equipment. Air Force Office of Scientific Research, Washington, D.C.

—General Electric, West Lynn, Mass. $[illegible]287,920. 1967 component improvement engineering program for J-85 engines. Aeronautical Systems Div., (AFSC), Wright-Paterson AFB, Ohio.

2—I.B.M., Owego, N.Y. $1,564,94[illegible]. Repair and modification of components of the bombing navigation system for B-52 aircraft. Warner Robins Air Materiel Area. (AFLC), Robins AFB, Ga.

—Tridea Electronic, Pasadena, Calif. $1,[illegible]930. Electronic instruments. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

—Olin Mathieson Chemical Corp., East Alton, Ill. $5,246,250. Aircraft engine starter cartridges. Marion, Ill. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Magnavox Co., Fort Wayne, Ind. $[illegible]596. Production of airborne communications equipment. Fort Wayne. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

5—Maxson Electronics Corp., Macon, Ga. $1,293,534. Bomb fuze components. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

—Martin Marietta, Baltimore, Md. $[illegible]490. Integration and installation of government furnished equipment to convert KC-135 aircraft to RC-135 configuration. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

8—Edgerton, Germeshausen and Grier, Inc., Bedford, Mass. $3,465,534. Production of weather plotting communication equipment. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass.

9—Applied Technology, Inc., Sunnyvale, Calif. $1,037,500. Production of spare parts for radar equipment for B-52 aircraft. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—Oakland Construction Co., Salt Lake City, Utah. $1,793,000. Construction of a Minuteman engineering test facility at Hill, AFB, Utah. Army Engineer, Sacramento, Calif.

13—Ling Temco Vought Aerospace Corp., Dallas, Tex. $1,500,000. Space vehicles. Space Systems Div., (AFSC), Los Angeles, Calif.

—Hazeltine Corp., Little Neck, N.Y. $[illegible]888. Integrating the MK XII re-entry vehicle with the ballistic missile systems. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Bendix Corp., Davenport, Iowa. $1,[illegible]. Production of airborne computer components. Denver, Colo. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—General Electric, Cincinnati, Ohio. $[illegible]515. Production of J-79-17 aircraft engines. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

15—United Aircraft, East Hartford, Conn. $[illegible]500,000. Work on advanced aircraft propulsion systems. Aeronautical Systems

Div., (AFSC), Wright-Patterson AFB, Ohio.

—Kaman Aircraft, Bloomfield, Conn. $1,-710,961. Production of HH-43 helicopters and related equipment. Bloomfield. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Radiation Service Co., Melbourne, Fla. $2,-255,000. Support services on the ballistic missile re-entry data processing system. Holloman AFB, N.M. Air Force Missile Development Center, Holloman AFB, N.M.

—Aircraft Armaments, Cockeysville, Md. $2,-115,414. Production of electronic countermeasures training equipment. Aernautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Kollsman Instrument Corp., Elmhurst, N.Y. $1,330,295. Production of computer test equipment. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—General Electric, Cincinnati, Ohio. $1,500,-000. Work on advanced aircraft propulsion systems. Evandale, Ohio. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—International Telephone & Telegraph Corp., Nutley, N.J. $5,642,300. Production of airborne LORAN navigational sets and related equipment. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Martin-Marietta, Orlando, Fla. $2,500,000. Production of space vehicle guidance system components. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Cessna Aircraft, Wichita, Kan. $1,150,000. Production of T-37 trainer aircraft. Wichita. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

6—Applied Technology, Inc., Palo Alto, Calif. $1,475,230. Production of electronic equipment and for F-100 aircraft. Sunnyvale and Palo Alto, Calif. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—Continental Electronic Mfg. Co., Dallas, Tex. $2,000,000. Development on ballistic re-entry systems. Rome Air Development Center, (AFSC), Griffiss AFB, N.Y.

—AVCO Corp., Cincinnati, Ohio. $2,308,936. Defense radar display systems. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass.

—International Telephone & Telegraph Corp., Fort Wayne, Ind. $2,978,000. Production of a Strategic Air Command operational planning system. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass.

—AVCO Corp., New York, N.Y. $1,495,000. Design, development and production of a penetration aids system. Stratford, Conn. and Wilmington, Mass. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—Martin-Marietta, Orlando, Fla. $2,000,000. Production of components for Bullpup air-to-ground missiles. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Wilcox Electric Co., Kansas City, Mo. $2,-605,962. Production of VHF communication equipment. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Elder-Oilfield, Inc., Houston, Tex. $4,066,-971. Production of prefabricated medical facilities. Vicksburg, Miss. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—Sanders Associates, Bedford, Mass. $2,999,-000. Production of fuzes for aircraft ordnance. Aernautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Brooks & Perkins, Detroit, Mich. $2,582,-378. Production of air cargo loading pallets. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—Litton Systems, Woodland Hills, Calif. $8,-186,840. Production of components for the avionics system of F-4 aircraft. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Aerojet General, Sacramento, Calif. $6,-200,000. Components for the TITAN 111M rocket system. Space Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—General Motors, Indianapolis, Ind. $5,997,-331. T-56 engine component improvement program. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Aerojet General, Azusa, Calif. $1,545,000. Advanced aerial reconnaissance studies. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—General Precision, Binghampton, N.Y. $1,-241,865. Production of instrument flight trainers. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Lockheed Aircraft, Marietta, Ga. $5,008,-844. Production of C-141 engine build-up kits. Chula Vista, Calif. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—Boeing Co., Wichita, Kan. $1,158,596. Modification and maintenance of B-52 aircraft. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

27—Lenkurt Electric Co., San Carlos, Calif. $2,004,500. Production of tranportable radio communication systems. Oklahoma City City Air Materiel Area, (AFLC), Tinker AFB, Okla.

28—Goodyear Aerospace Corp., Litchfield Park, Ariz. $1,600,000. Research on high resolution radar. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Pan American World Airways, New York, N.Y. $35,000,000. Management, operation and maintenance services for the Eastern Test Range, Fla. Air Force Eastern Test Range, Patrick AFB, Fla.

—General Electric, Philadelphia, Pa. $1,600,-000. Research and development on ballistic re-entry vehicles. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—ARO, Inc., Arnold Air Force Station, Tenn. $48,300,000. Management, operation and maintenance services at Arnold Engineering and Development Center for FY 1968. Arnold Engineering & Development Center, Arnold AFS, Tenn.

29—Batesville Mfg. Co., Batesville, Ark. $1,-708,741. Production of bomb components. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—General Electric, Burlington, Vt. $1,326,-075. Procurement of spare parts for aircraft armament. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Martin Marietta, Denver, Colo. $7,982,322. Procurement of Titan IIIX space boosters and associated equipment. Space Systems Div., (AFSC), Los Angeles, Calif.

30—Texas Instruments, Dallas, Tex. $3,378,512. Design, development and production of a tactical information processing sub-system. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Hughes Aircraft, Culver City, Calif. $3,-110,000. Research work on advanced reconnaissance systems. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Hallicrafters Co., Chicago, Ill. $1,500,000. Production of components for electronic countermeasure systems. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Wilcox Electric Co., Kansas City, Mo. $1,-460,547. Production of VHF airborne radio sets. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Lockheed Aircraft Corp., Ontario, Calif. $7,000,000. FY 1968 maintenance services in support of the F-104 transition pilot training program. Luke AFB, Ariz. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

—North Electric Co., Galion, Ohio. $4,538,-096. Design, production and testing of tactical communication systems. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass.

—Lockheed Aircraft Service Co., Jamaica, N.Y. $4,883,410. Annual maintenance service for Special Air Mission Aircraft for FY 1968. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

—FWD Corp., Clintonville, Wis. $1,503,228. Production of fire fighting trucks. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—Continental Electronics Mfg. Co., Dallas, Tex. $1,412,613. FY 1968 operation and maintenance of the Ram and Stallion Radar sites. Holloman AFB, N.M. Air Force Missile Development Center, Holloman AFB, N.M.

—General Dynamics, Fort Worth, Tex. $1,-290,950. Operation and maintenance of the Air Force Radar Target Scatter Site for FY 1968. Holloman AFB, N.M. Air Force Missile Development Center, Holloman AFB, N.M.

Progress in SAIMS
(continued from page 14)

but not yet completed. In order to prevent distortions within the contractor's control system, such "in-process" effort must be evaluated on a continuing basis through the use of objective indicators or reasonable and consistent estimation techniques, such as equivalent unit costing in manufacturing areas.

Work Packages. A delineation of the work required to complete a specific job, with objective indicators defining start and completion dates. It must have a planned cost which is time phased and integrated with master and detailed engineering and manufacturing schedules, representative of the described job, and delineated by cost elements, *i.e.*, labor, material, other direct costs. The overall responsibility for the actual performance of the work content of a Work Package must be limited to a single operating level organization.

DEFENSE PRIME CONTRACT AWARDS TO SMALL BUSINESS

(Amounts in Thousands)

	July 1966–May 1967	July 1965–May 1966
Procurement from All Firms	$34,156,591	$28,422,838
Procurement from Small Business Firms	7,020,250	6,287,421
Percent Small Business	20.6	22.1

OFFICE OF THE SECRETARY OF DEFENSE
WASHINGTON, D. C. 20301

OFFICIAL BUSINESS

POSTAGE AND FEES PAID

New Naval Communications Command Established in Washington, D.C., Area

A new Naval Communications Command, located in the Washington, D.C., area, became operational on July 1, 1967, as a result of a major reorganization of the Office of Naval Communications.

Under the revised organizational structure, Rear Admiral Robert H. Weeks, Assistant Chief of Naval Operations (Communications)/Director of Naval Communications, has been assigned additional duty as Commander, Naval Communications Command, reporting to the Chief of Naval Operations. He has assumed command of all shore (field) activities with responsibility for their primary support. He is also responsible for providing the Navy-wide communications and cryptologic needs of all ships, air and shore activities.

The new command will be concerned primarily with day-to-day operations of the Navy's world-wide communication and cryptologic facilities, permitting greater emphasis, at the Chief of Naval Operations level, on policy matters and support of DOD and Joint Chiefs of Staff communications programs. At the same time closer integration of facilities under field (command) jurisdiction will improve communications support for the fleet.

Tasks and functions to be performed by the command will include those previously assigned to the following separate activities, which have been disestablished: the Naval Communications System Headquarters, Bailey's Crossroads, Va.; and the Naval Security Group Headquarters and the Naval Radio Frequency Spectrum Activity, both at the U.S. Naval Security Station, Washington, D.C.

The command will also be responsible for the operational support of the Defense Communications System, the National Security Agency, the Electromagnetic Compatibility and Analysis Center and the National Communications System.

The Office of the Assistant Chief of Naval Operations (Communications), located in the Pentagon, will perform such staff functions as validation and approval of requirements, planning, program review, evaluation and appraisal.

Continuous Wave Laser in Operation at Redstone Arsenal

The longest, most powerful continuous wave laser in existence has been put into operation by the Research and Development Directorate of the U.S Army Missile Command at Redstone Arsenal, Alabama.

The nitrogen-carbon dioxide helium laser is 178 feet long and generates an output power of 2.[illegible] kilowatts. With slight modifications, however, the laser could generate an output of 4.5 kilowatts. The present system operates with an efficiency of 10 to 14 percent. When the modifications are completed, it is expected to operate with an efficiency of 20–28 percent.

Scaling laws, various discharge configurations, gas mixtures, optical components and spectra of the output radiation and of the discharges are being studied in attempts to determine the optimum operating characteristics, and to produce better understanding of the mechanisms which make these molecular lasers so efficient.

This research is being conducted by the Missile Command's Physical Sciences Laboratory.

☆U. S. GOVERNMENT PRINTING OFFICE : 1967 [illegible]

DEFENSE INDUSTRY BULLETIN

VOL. 3 NO. 8 SEPTEMBER 1967

ARISTOTLE

IN THIS ISSUE

FEATURES

DEPARTMENTS

The *Defense Industry Bulletin* is published monthly by the Business & Labor Division, Directorate for Community Relations, Office of the Assistant Secretary of Defense (Public Affairs). Use of funds for printing this publication was approved by the Director of the Bureau of the Budget.

The purpose of the *Bulletin* is to serve as a means of communication between the Department of Defense (DOD) and its authorized agencies and defense contractors and other business interests. It will serve as a guide to industry concerning official policies, programs and projects, and will seek to stimulate thought by members of the defense-industry team in solving the problems that may arise in fulfilling the requirements of the DOD.

Material in the *Bulletin* is selected to supply pertinent unclassified data of interest to the business community. Suggestions from industry representatives for topics to be covered in future issues should be forwarded to the Business & Labor Division.

The *Bulletin* is distributed without charge each month to representatives of industry and to agencies of the Department of Defense, Army, Navy and Air Force. Requests for copies should be addressed to the Business & Labor Division, OASD(PA), Room 1E764, The Pentagon, Washington, D.C. 20301, telephone, (202) OXford 5-2709.

DEFENSE INDUSTR
BULLETI

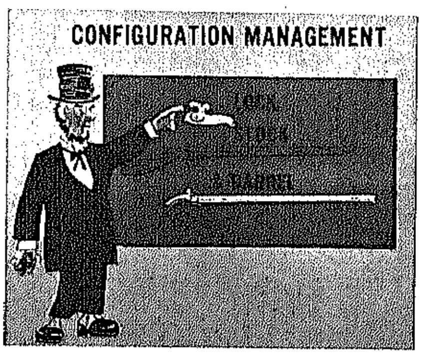
Published by the Department of Defense

Objectives of Configuration Management

Lieutenant General William B. Bunker, USA

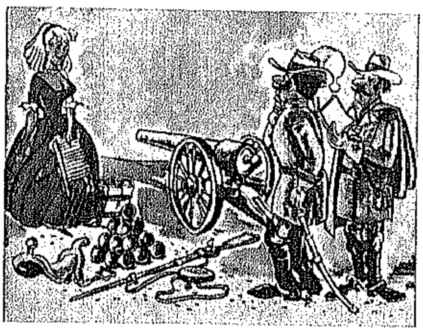
Our overall objective in the Army is to make sure that the combat soldier has the best possible weapons and equipment and that he has it at the right place, right now, in the needed quantities. Configuration management can help the Army achieve this objective.

Early discussion on configuration management inspired fears that a whole new discipline—bringing with it a whole new breed of people—was being created. Nothing could be further from fact. The new emphasis on the subject simply reflects an attempt to restore an ancient principle, tailored to a new set of conditions.



We had it, then lost it. Eli Whitney introduced configuration management at the beginning of the last century. His techniques gave the North an edge on the South during the Civil War that some historians credit with ultimate victory. It was a new thing then to introduce weapons with completely interchangeable parts. In many areas, it would be a new thing today, and it could give us a tremendous edge in any new combat.

Back in the days when life and weaponry were simpler, the Military Departments had no trouble defining the hardware they wanted, and producers had no trouble living with the simple specifications that established requirements. In the beginning, the producer was often just another agency of the requiring Department; no contracts were involved, communications were uncomplicated, and costs were nearly constant, whether plans changed or not.



In those days, there weren't many ways to solve a given problem. There were only a few acceptable designs for a saddle, or a cannon ball, or a musket. It didn't take so many tons of paper to define a piece of hardware. But things have changed.

Someone has estimated that the documentation for a new aircraft weighs more than the aircraft, and another statistician has computed the number of cars in a freight train needed to haul design and production data for a new missile system. Obviously, nothing that complex can be managed—unless we can simplify the system.

Configuration management is an attempt to simplify the system. It seeks to reduce the elements involved to their simplest terms, equip each problem with a convenient handle, and display the whole situation in such a fashion that management can comprehend it, analyze it, and control it.

Actually, it doesn't do anything Eli Whitney didn't do a century and a half ago. It defines the product, its components, and their interfaces. It restricts idle change, and it requires precise records of the changes that are authorized. But it does it in a modern manner.

Objectives of the Techniques

The goal, of course, is to solve the problems that could be identified.

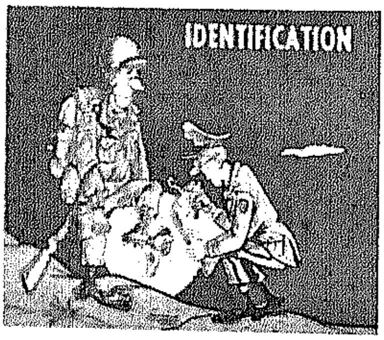
- The **object of each** new project must be established early in the program. Once established, the objectives must be freed from vacillation.
- All practical approaches to achievement of the established objectives must be studied, and the best one selected. Once selected, maximum effort must be directed along the chosen course.
- Change activity must be reduced to the realistic minimum, and the reduced activity must be handled expeditiously.

- Maximum uniformity must be effected where the Military Departments interface with industry and with each other.
- Control must be exercised during production to assure maintenance with uniform spare parts, tools, test equipment and instructions, and reproduction in a competitive market.
- Authority and responsibility for configuration management of each item must be assigned to a designated individual.

Fringe Benefits Expected

With the achievement of these objectives should come a long list of fringe benefits. Among them are:

- Assured hardware performance and improved logistic support and weapons readiness.
- Enhanced standardization and item-entry control.
- Increased competitive procurement.
- Reduction of requirements for technical data of doubtful value.
- Increased uniformity of contract administration.



- More effectiveness and timeliness in management decisions at all levels.
- Intermeshed implementation of such other DOD programs as contract definition, the Resource Management Systems, PERT, value engineering, and technical data management and standardization.

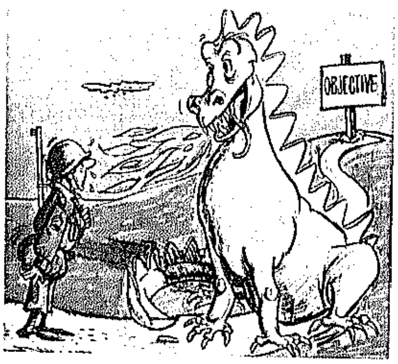
Three Phases of Configuration Management

The success of the configuration management technique depends on the balanced integration of three interrelated, mutually supporting phases.

- Configuration identification.
- Configuration control.
- Configuration status reporting.

Configuration identification is the documented descriptions of systems and equipment.

In order to serve the combat soldier, we must get a clear expression of his needs. He expresses his needs through the Combat Developments Command in the form of a Qualitative Materiel Development Objective (QMDO) or a Qualitative Materiel Requirement (QMR). In the Army Materiel Command (AMC) we ratify these documents and identify the risk involved in satisfying the requirement and, when the document is approved by the Department of the Army, it is considered a contract between AMC and the user.



When the user is not quite sure what he needs, he states his objective in a QMDO and we, together with industry's strong right arm, help him refine his objective during contract definition into a system description, *i.e.*, QMR, technical characteristics and test and evaluation requirements, along with a description of work and services for the development. Thus we have created a clear identity of the equipment the user wants.

When completed it is duly released and recorded in the status recording system or data bank. This identity is the product of many different types of people, all with differing and sometimes diverging interests. Some of these people, in addition to the project engineer, are the standards engineer, maintenance engineer, production engineer, human factors engineer, training specialist, support equipment specialist, publications specialist, and test engineer.

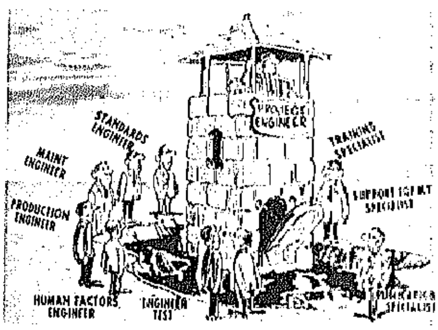
Each of these people has a part to play in fielding a satisfactory and complete weapon system. But, alas, some of these birds are not of tl same feather and don't always tal on the same frequency. In fact, the don't even speak the same languag Project managers and commodit managers have done much to brea down these walls, and the formal r view of Engineering Change Pr posals should improve communic tions.

Awarding the Development Contract

Theoretically, then, when we awar a development contract to indus try, it reflects not just the specif functions of the weapon itself; i should, hopefully, reflect the enviror ment in which it will operate, th support requirements, its relatior ship to other weapon systems, trair ing implications, maintenance, publ cations and operability.

It also has gone through the r quirements of concept formulation t assure that we have done our home work before going to industry.

Industry now has our work stat ment in terms of performance r



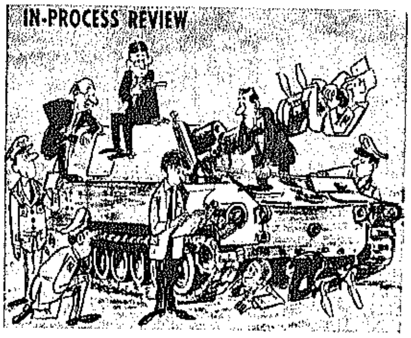
quirements. Its engineers, as the progress on their design work, inevi tably come up with proposed change to improve performance, schedule, o cost, in response to incentive provi sions in our contracts, among othe considerations.

The performance descriptions i many instances do permit, and eve encourage, changes as a result o trade-off studies within the scope o the contract. This is done to permi the contractor maximum latitude an creativity in developing the best bang for a buck.

The In-Process Review

However, these proposed change must be reviewed when they affec

the performance requirements because we have a written contract with the user. In-process reviews during the development process, with representatives of the various functional activities, provide a means of design control to assure that we progressively keep our customer's needs in mind and inform him of our progress.



The Configuration Audit Review

To assure that the weapon, which has satisfied our user test requirement, can be built again, we require two additional reviews of our drawings and specifications, one of which may be conducted concurrently with the prototype systems review. This is the configuration audit review.

The configuration audit review verifies that the drawings and descriptions accurately describe the service test models and, when updated, reflect the correction of service test defects. This represents the Technical Data Package used in the first article configuration review. This latter review is a technical audit to verify that the production item conforms to the Technical Data Package and will satisfy the user.

Engineering Change Policy Aids Configuration Control

The introduction of configuration management has had a significant effect on our attitude concerning engineering changes. Proposed engineering changes now receive a greater degree of scrutiny than ever before. Technical feasibility alone does not constitute the sole justification for the approval and incorporation of engineering changes to hardware or software.

Proposed changes must survive the super-critical probing of the change control staff and project manager or approving authority to achieve acceptance. This analysis consists of an unrelenting application of trade-off considerations that must prove the worth of the change. The proposed change must be necessary to correct design deficiencies to provide for approved changes in operational characteristics; to effect overall net savings; to relieve production stoppages; or otherwise to offer a significant net benefit to the Government.

Configuration Status Reporting

Configuration status reporting involves our engineering records system. This element involves the recording of the QMR, the Development Purchase Description, and the Technical Data Package used for quantity production and any changes to each, including modification work orders by serial number, to provide the manager with current visibility of his program and equipment at all times, even in the operational period.

Industry Help Needed

AMC has directed that configuration management be implemented on all major projects. Implementing this discipline effectively requires close industry support on a continuing basis. Industrial executives will be much concerned with the specific requirements of configuration management particularly

siles have switched from field artillery to air defense and back again, from liquid to solid propellant, and from short, to medium, to long range. Similar changes have been made in ship and land vehicle requirements. These have resulted in increased costs, stretched-out schedules, and even the death of projects.

We have delivered spares that didn't fit, tools that wouldn't work, and instructions that didn't match the hardware. And there's nothing in the new configuration management techniques that, by itself, will prevent it from happening again. If we are to be more successful now, it will be because of the additional discipline, uniformity and systemization introduced with the new regulation—and the conscientious intelligence with which it is implemented.

Configuration management provides a tool for correction of many of AMC's hardware problems. But it's not a fully automatic tool—it can't be installed, programmed, switched on, and left to run itself. Like most tools, it will perform well only when used with skill, conscience, discretion and energy.

Project ARISTOTLE

Eugene T. Ferraro

Project ARISTOTLE (Annual Review of Information and Symposium on the Technology of Training and Learning and Education) was announced in the March 1967 issue of the *Bulletin*. In my capacity as DOD executive agent for ARISTOTLE, I attempted to describe in that article the purpose and scope of this joint effort among representatives from the emerging education technology industry, the Defense Department, Office of Education, and other interested Federal agencies. In response to that article and other announcements, a great number of inquiries have been made about the progress of ARISTOTLE. In this article I would like to highlight some of the significant activities, progress and expectations of ARISTOTLE.

The ARISTOTLE Steering Committee, chaired by Marvin Kahn, Vice President, Aircraft Armaments, Inc., is comprised of 10 task groups. The task groups and their chairman are listed below:

Project 100,000
Chairman: Dr. Gilbert E. Teal,
Dunlap & Associates, Inc.

Media
Chairman: F. A. Centanni,
Sylvania Electric Products, Inc.

Information Storage, Retrieval and Dissemination
Chairman: Dr. Paul Weaver,
Xerox Corp.

Educational Research
Chairman: Dr. James E. Gilbert,
Northeastern University

New Developments
Chairman: Dr. Harvey J. Brudner,
Westinghouse Learning Corp.

Systems Approach to Education
Chairman: Henry Lehmann,
General Electric Co.

Standards, Measurement and Evaluation
Chairman: Dr. D. W. Meals,
Raytheon Co.

Courses, Tasks and Skills
Chairman: Walter Stellwagen,
Science Research Associates

Government-Industry-Education Interface
Chairman: T. W. St. Clair,
North American Aviation, Inc.

International Considerations
Chairman: T. Jack Heckelman,
Philco Corp.

The primary function of the Steering Committee is to provide policy guidance and to coordinate the activities among the 10 task groups. At the same time they have been maintaining contact with relevant government officials to ensure that the problem areas, which ARISTOTLE groups are looking into, correspond with priority areas of concern to Federal agencies, local governments, and potential users of innovations in education.

The problem and priority areas presently being studied will be topics of discussion to be conducted by 10 panels, consisting of ARISTOTLE members, at a symposium to be held on Dec. 6 and 7 in Washington, D.C. In addition to the panel meetings, plans are being made to have noncommercial demonstrations of advanced application of new education technologies at the December symposium.

Media

The task group studying media, headed by Mr. Centanni, has been reviewing effectiveness studies of existing media which have been used in training and education programs, both within and outside the military.

The East Coast Group is reviewing selected current and past programs where new uses of media have been made, including:

- Oakland Community College, Bloomfield Hills, Mich., which is attempting to automate and individualize instruction for its students.
- The Oak Park and River High School Project, Oak Park, Ill., which is using a random access audio retrieval system.
- The New York City "Shut-In" Program utilizing audio-visuals, the telephone and educational television.

The West Coast Group is surveying the usage of media in the Minuteman and Polaris programs, as well as evaluation of existing media used at the San Diego, Calif., Naval Training Center.

We are hoping that these studies will provide some new insight explaining perhaps why certain media have been more successful than others for particular types of instruction.

Information, Storage and Retrieval

The overall objective of this task group is to survey the state of the art in various aspects of information, storage and retrieval (IS&R). Fifteen subgroups have finished their reviews of storage systems, dissemination and communications, copyrights, libraries, software and definitions. Prior to the December symposium, the Education Communications (EDUCOM) Information Network, Education Research Information Centers (ERIC), the regional educational laboratories, file systems, and time-sharing will have been covered. These reviews will be published prior to the conference in order to facilitate criticism and discussions. This group's efforts and its recommendations should pay off handsomely in assisting an equitable and efficient dissemination of research results, training material, and other information directly related to the improvement of education.

New Developments

Dr. Brudner and his associates have been concerned with identifying, encouraging and communicating "new developments" in equipment, processes and approaches in the field of educational technology. New developments with respect to effectiveness, validity and operational practicality are being evaluated. The group is investigating new teaching machines, audio-visual systems, computer software, related areas of automated testing procedure, communication contributions, and computer assistance systems.

Four meetings, attended by an average of 35 industrial, military, university and other representatives have been held to discuss new developments, and the following future projections appear to have achieved a general consensus:

Computer-Assisted Instruction (CAI)

- Most systems presently in use are experimental. At present the Defense Department is supporting at least 10 major projects in the state of development.
- A complete CAI system development may take as long as six to eight years to evolve to an operational status, with the average time to develop a full course for a CAI system taking two years.
- Some of the best software materials are being generated by team efforts, requiring as long as six months before they are well integrated and productive. A major problem here is to find the best organizational technique to facilitate effective cooperation between hardware, software and curriculum experts.
- System capabilities are now limited to about 30 terminals costing several thousand dollars each. Several projects, being funded by DOD, indicate that multi-access, online, time-shared systems will greatly expand the potential of CAI. Also, important breakthroughs are occurring in the area of devices for student input, such as the Plasma Tube Display Panel developed by the University of Illinois on the PLATO program.
- Some long-range research is now leading to application of artificial intelligence techniques in CAI systems. In these approaches the computer would be able to generate sentences automatically via syntactical and transformational rules and language processing capabilities.
- New developments in software generation are cutting the present ratio of 125-manhours effort to generate one hour of CAI software.

Audio-Visual Developments.

- New motion picture film formats, such as super 8mm, which allow for more efficient use of film area and higher sound fidelity, have

phone wires, will have a significant impact on learning.

- Use of satellite systems, plus new integrated, wide bandwidth receiving antennas, will provide new opportunities in education by several orders of magnitude.

Teaching Machines and Recorders.

Major trends in the near future include:

- Increasing use of magnetic belt, compact recording systems in education and training.
- Development of higher quality and lower-cost color video recording systems.
- Integration of slide projectors and magnetic tape audio systems.
- Economical, random-access magnetic recording and playback units.
- New techniques for computer-generated software for teaching machine systems, including computer-animated films.
- New semi-computerized teaching machine systems.

While the discussions of the New Developments Task Group have been directed largely toward new technological developments, it has increasingly become apparent that management capabilities and procedures generally have not been developed to use effectively the technology which is available. Obsolete or nonperformance based on procurement specifications, fragmentation of decision making, inadequate project man-

training in clear and simple terms, hoping that a prescriptive methodology can be compiled into a small booklet which will be the basis for the panel discussion at the symposium. At the December symposium three cases histories, in which the systems approach has been used (including Oakland Community College), will be presented and analyzed against the check-list in the booklet to encourage constructive criticism, and to point out the problems in attempting to systematically analyze education endeavors.

Standards and Measurements

The purpose of this task group's effort is to minimize the communications gap between industry, DOD and the education community regarding standards of measuring the effectiveness of the new technology. Members of this group are now reviewing certain procurement specifications to determine the impact they have on the type of media which are allowable. Pedagogical measures, such as the 90/90 criteria (90 percent of the students make 90 percent or above on tests) in programmed learning, are being studied to determine whether such criteria are adequate.

Courses, Tasks and Skills

Working closely with other task groups this particular task group, under Dr. Stellwagen's leadership, will focus its attention largely on how industry can assist DOD in Project TRANSITION. President Johnson in his 1967 Manpower Report to the Congress stated: "We must make military service a path to productive careers. To help them (Service separatees), I have asked the Secretary of Defense to make available, to the maximum extent possible, in-Service training and educational opportunities which will increase their chances for employment in civilian life."

The Secretary of Defense has established Project TRANSITION to carry out the President's desire. The target group for the initial phases of the project will be those individuals who have from one to six months' service time remaining, and who have expressed their intention not to reenlist. The project will ascertain the kinds of in-Service training this group desires and their educational needs. It will then furnish training or educational courses which are keyed to favorable employment opportunities.

Pilot programs have been initiated at Fort Knox, Randolph AFB, Treasure Island, and Camp Lejeune. Industrial assistance will certainly be helpful in relating the skill requirements and job demands which they are planning. Moreover, with the existing pressures on existing Service facilities, there would appear to be an opportunity to utilize some of the new education technology and self-instruction principles in off-duty hours instructions, as well as to supplement existing formal and on-the-job training now being conducted by the military.

Government-Industry-Education Interface

As industry tries to enter the education market, ideological issues raised are second only to parochial interests which need to be quelled. The fundamental problem appears to be whether or not a mechanism can be developed which can guide the prodigious resources of industry in such a way that the public interest in education can be best served.

The first step here is to ensure effective communications between the supplier and the users. To accomplish this, Mr. St. Clair and his task group have prepared a questionnaire to be sent to over 600 companies. The results of the questionnaire, to be discussed at the December symposium, should provide among other things:

- An inventory of company interests which will provide a data base for DOD and other Federal offices.
- An indication of industry research and development emphasis in the education area.
- An inventory of in-house training and education programs which industry is now conducting.

Dr. Eugene T. Ferraro has been serving as Deputy Under Secretary of the Air Force for Manpower since June 6, 1966. Dr. Ferraro, a native of Patterson, N.J., is a graduate of Rutgers University. He received his doctorate from the New School for Social Research, New York, N.Y. From 1953 to 1966, Dr. Ferraro served with the Aerospace Group, General Precision, Inc.

Summary

Several comments about the general status of ARISTOTLE and its activities are appropriate here.

First of all, the major objective of ARISTOTLE is to improve communications among industry, the Government and the education community. The joint discussions held thus far have been very beneficial and we anticipate that the December symposium will further improve effective communications.

Second, although this is a follow-up action to the government-sponsored June 1966 conference, the industry-manned Steering Committee, working closely with the staff assistance of the National Industrial Security Association (NSIA), is accepting responsibility and leadership. Federal officials, including members of the Military Services, are serving as subject matter advisors and briefers only upon request of the task group chairman.

Third, most of the on-going activities of ARISTOTLE are focused on the December symposium. We do, however, expect ARTISTOTLE to be a continuing annual review of activities in this new area of emerging education technology. NSIA assisted us in handling the administrative tasks of the June 1966 conference; this year it is also handling the December symposium.

Lastly, the participation of ARISTOTLE is broadly based. More than 20 percent of its members are non-NSIA members; over five percent have university affiliations, and over 10 percent come from not-for-profit organizations. Quite intentionally, we have encouraged the broad base to get the cross-fertilization that is

(*Continued on inside back cover*)

Managing the Naval Material Command

Vice Admiral Ralph L. Shifley, USN

The Naval Material Command (NMC) is charged with effectively, efficiently and economically converting Navy assets and resources—talent, time and money—into the goods and services required by the operating forces of the Navy and the Marine Corps. In fulfilling their responsibilities, Navy managers, like their counterparts of business and industry, face one underlying problem: the problem of determing how best to employ their resources in the pursuit of their goals.

In NMC three fundamental rules govern the Navy's basic approach to efficient management of the large-scale technical programs which produce the wherewithal of seapower. These rules are:

- The responsibilities of each element of the NMC are clearly defined.
- "Systems Projects" are employed to control and coordinate the efforts of the NMC within broad, related technical areas.
- Project management is employed where the benefits of this intensive management technique warrant extraordinary management measures.

The main functional efforts of the NMC are carried out by six operating organizations—the systems commands. Each systems command has one specific, related set of responsibilities.

- The Naval Air Systems Command, for example, is responsible for the total Naval air weapon.
- The Naval Ship Systems Command builds, overhauls and repairs ships and certain of their principal components.
- The Naval Electronic Systems Command performs material support functions for shore electronics, and for certain other electronic systems. It is the Navy-wide technical authority for electronics standards and compatability.
- The titles of the Naval Ordnance, Supply, and Facilities Engineering Commands suggest the basic functions of those organizations.

A review of the duties of the systems commands shows that full authority and responsibility, in specified technical areas, are assigned to certain systems commanders. This has been done very carefully and in considerable detail, as a basic management concept within NMC.

The management problem here is to carefully identify the interfaces between the systems commands. This has been done, and the "territory" of each systems command is spelled out in its charter. Sharp interfaces and precise definition of responsibility have been made matters of record.

Vice Admiral Ralph L. Shifley, USN, became Deputy Chief of Naval Operations (Logistics) on Aug. 1, 1967. At the time this article was written, he was Vice Chief of Naval Material. Before his assignment to the Naval Material Command in 1963, Admiral Shifley served as Commander, Carrier Division Seven. He is a 1933 graduate of the U. S. Naval Academy.

In some cases the exact borderline between responsibilities of systems commands is difficult to draw in advance. In these cases, one commander is given, in his charter, controlling authority over a given subject.

For example, several systems commands may have responsibility to provide equipment for a new ship. Someone must make certain that every item of equipment is compatible with every other item. To handle this type of problem, the charter of the Ship Systems Command assigns responsibility for "total system integration" to the commander of that systems command. Similarly, the Electronic Systems Command is responsible for overall Navy electronics standards and compatibility.

This emphasis on precise definition of interfaces, on careful and formal delineation of responsibilities, on elimination of hazy areas, is one of the underlying principles of management within NMC.

A second principle is applied when the weapons required in certain broad fields of warfare must be pulled together from throughout NMC, and managed as entities. In these cases, NMC utilizes the unique capabilities of systems project managers.

The manager of the Anti-Submarine Warfare (ASW) Systems Project, for example, crosses the boundaries of all the systems commands to assure unity of material support throughout this broad area of warfare. The manager of the ASW Systems Project controls the characteristics of some 160 major items of ASW hardware.

The Navy has three such systems projects: the Surface Missiles Sys-

tems Project, the Fleet Ballistic Missiles Systems Project, and the Anti-Submarine Warfare Systems Project.

A systems project manager gives overall guidance and direction in a total warfare area. He monitors, coordinates and integrates tasks related to material items under his cognizance, wherever these tasks may be performed.

You have seen that one primary management technique used within NMC is to precisely define interfaces between systems commands and describe these boundaries in the characters of the commands. The second basic technique is to establish systems project managers whenever a great many systems, relating to a single broad area of warfare, must be managed in a carefully coordinated fashion.

The third fundamental management procedure within NMC is to utilize project management where this special technique is warranted.

Project management may be called for under various combinations of situations. For example, project management may be appropriate where there is a clearly definable job to be done, with a beginning and an end, which:

- Is of urgent military necessity.
- Has top level interest.
- Is particularly expensive.

Work efforts involving more than $25 million for research and development, or $100 million for production, are projected, with very few exceptions.

Other criteria may include:

- Exceptional complexity.
- Multiple agency or Service interest.
- Advanced technology.
- High risk of slippage in schedule or cost.

The Polaris project, for example, had and still has most of these characteristics. It was definable, costly, complex, urgent and vital.

When a project is established, a project manager, supported by a highly qualified staff, is formally charged with providing:

- Singleness of purpose.
- Coordination and control of resources (talent, money and time).
- Machinery for making decisions rapidly.
- Appropriate executive authority for the expeditious achievement of his goals.

The Navy has 12 designated projects today at the level of the Chief of Naval Material. They are:

PM1 Fleet Ballistic Missile Systems Project.

PM2 F–111B/Phoenix Weapon System Project.

PM3 Surface Missile Systems Project.

PM4 Anti-Submarine Warfare Systems Project.

PM5 Instrumentation Ships Project.

PM6 ACLS Project.

PM7 REWSON Project.

PM8 Project AIMS.

PM9 Project OMEGA.

PM10 Fast Deployment Logistics Ship Project.

PM11 Deep Submergence Systems Project.

PM12 Naval Inshore Warfare Project.

On completion of the specific task for which the project is organized, the project will be disbanded and its resources reassigned to the functional commands.

The organization of the NMC as a whole is shown in Figure 1.

As you see from the dashed line, the project managers and systems project managers have authority to draw on the resources of all the functional commands.

Within the field activities is a complex of 29 laboratories which supports the systems commands and the project managers.

These are all commanded by the Chief of Naval Material and are available to perform work assigned to them by a variety of customers. Due to their special capabilities, certain of these laboratories work almost exclusively for a single systems command. Fifteen of the 29 have this characteristic. The others put their efforts into tasks requested by several systems commands, by the other Services, or by the National Aeronautics and Space Administration, the Federal Aviation Agency, or other agencies.

This is an outline of the basic principles of management and a thumbnail sketch of the organization utilized by the Chief of Naval Material. Under his stewardship, about $11 billion dollars are spent each year in acquiring material and weapons, and in providing the material support required for the operating forces in the Navy and Marine Corps.

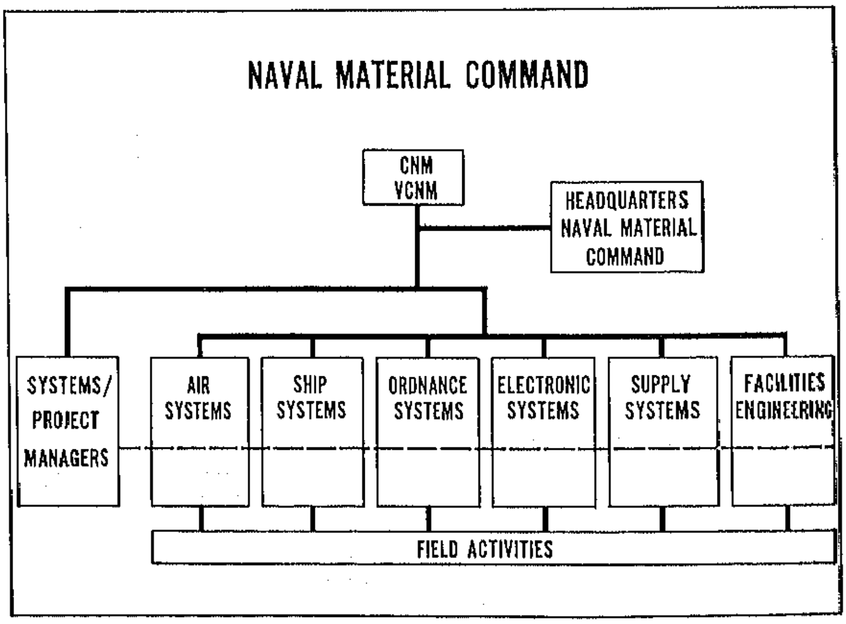


Figure 1.

Handicapped Workers Complete Important Defense Contract

Handicapped employees of the Opportunity Workshop of Lexington (OWL), Ky., have completed their second defense contract making an important contribution to the Vietnam effort by supplying 4,084 wooden supports for ammunition storage containers to the Naval Ordnance Depot, Crane, Ind.

Nearly all of the more than 450 physically and mentally handicapped trainees at OWL joined forces in completing the $26,402 contract, which provides the Navy a vital product used in shipping ammunition to Southeast Asia.

OWL, a non-profit, self-supporting corporation, was founded in 1961 by the Junior League of Lexington, and provides training for handicapped persons from the central Kentucky area, many of whom are former Veterans Administration hospital patients.

The center provides training in woodworking, upholstery, furniture refinishing, spray painting, small-truck driving, office work, and competes in the open market for contracts and jobs it is equipped to handle.

For the defense contract, awarded by the Defense Construction Supply Center, Columbus, Ohio, the OWL trainees cut and assembled pallet tops, side supports, and side panels which are used to enclose ammunition.

Workers at OWL must be vocationally handicapped, physically or mentally. They must be 16 years old or older, with a reasonable hope that after training they will be capable of obtaining regular jobs.

Ron Hampton, director of the Lexington workshop, stated during a program held at OWL in June, to give trainees a better understanding of the role they are playing in the Vietnam war effort, that the fact the contract was awarded to OWL shows the country's faith in the handicapped worker.

OWL was low bidder for the Navy contract over companies competing from a six-state area.

DOING THEIR PART IN THE VIETNAM EFFORT—Handicapped trainees of the Opportunity Workshop in Lexington, Ky., drill holes prior to the assembly of supports for ammunition containers. Looking on are Navy and Marine Corps personnel who visited the workshop in June to commend the workers for their efforts.

Industrial College Seminar Schedule Announced

The Industrial College of the Armed Forces, Washington, D.C., will conduct National Security Seminars during the 1967–1968 academic year in the following cities:

Casper, Wyo., Oct. 16–27; Wilmington, N.C., Nov. 6–17; San Antonio, Tex., Jan. 8–19; Lake Charles, La., Feb. 5–16; Merced, Calif., March 4–15; Minneapolis, Minn., April 1–12; and Gary, Ind., May 13–24.

The two-week seminars are based on the 10-month resident course on National Security conducted by the Industrial College. Each seminar consists of 32 lectures supplemented by visual aids. Two forums are also included.

Seminars will be conducted by a team of Army, Navy, Air Force and Marine Corps officers from the faculty of the Industrial College.

Administrative support is provided by a primary military sponsor, including a seminar administrator, who is a senior reserve officer called to active duty for 90 days. A civilian agency, usually the Chamber of Commerce, serves as co-sponsor, with a prominent citizen appointed locally as general chairman.

Attendance is open to representatives of industry, labor and the Government, as well as regular and reserve military officers who may request orders to attend through regular military channels. Civilians can obtain information on enrollment procedures from the Chamber of Commerce of the city where the seminar is to be held.

OD Instruction 5210.51

Airborne Passive Scanning Infrared Imaging Systems

C. Donald Garrett

The purpose of DOD Instruction 5210.51, "Security Classification Concerning Airborne Passive Scanning Infrared Imaging Systems," which became effective on Nov. 1, 1966, is to prescribe the following:

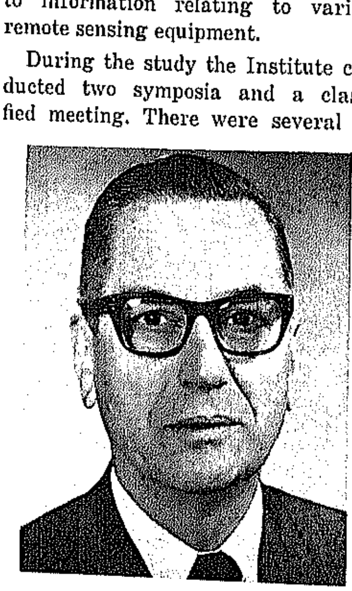
- Uniform standards and criteria for classifying information pertaining to certain airborne passive infrared imaging systems.
- Levels of capability of such imaging systems at and below which operating data can be disclosed without jeopardizing national defense.
- General guidance governing the issuance of specific classification guides for individual imaging systems.

This article will discuss the major features of the instruction and explain to some degree the philosophy or principle involved. To set the stage, it will be helpful to review some of the background events which led to its issuance.

Some six or seven years ago engineers and technicians concerned with remote sensing of the environment expressed themselves about the lack of knowledge and availability of various kinds of remote sensors. At that time it was felt that these deficiencies were traceable, in large measure, to the fact that many of these sensors had been developed by the military and the security classifications, which had been applied, made it difficult for non-military users to obtain the equipment or knowledge as to what this equipment could do. Consequently, they set out to see what could be done.

In 1961 the National Academy of Sciences-National Research Council became concerned officially. The upshot was a contract by the Office of Naval Research, jointly financed by contributions from the other Services, to the Institute of Science and Technology, University of Michigan, to conduct a study to determine what could or should be done concerning the security classifications assigned to information relating to various remote sensing equipment.

During the study the Institute conducted two symposia and a classified meeting. There were several in-



C. Donald Garrett is Deputy Director for Classification Management in the Directorate for Security Policy, Office of the Assistant Secretary of Defense (Administration). He has served in the Directorate for Security Policy since 1958 and previously was Executive Secretary of the Security Screening Board and Security Review Board, Office of the Secretary of the Army. He holds a bachelors degree from Franklin and Marshall College and an L.L.B. degree from George Washington University.

terim reports, notably one issued in December 1962 titled "Statement of Need for Reviewing Security Classifications Governing Airborne Electromagnetic Sensory Devices and Data." The final report was issued in October 1963.

Without attempting to brief all the substance of the Institute reports, it was found that remote sensing equipment using infrared and radar and the great bulk of the imagery taken with such equipment, was classified. This made it very difficult to find out just how this equipment could be used and how effective it might be in many non-military activities, notably petroleum exploration, forest fire detection and fighting, crop disease surveys, volcanology, water pollution, to name just a few. The report further indicated that overall values to the national economy, which would accrue from greater freedom of use of the equipment and imagery, would be significant. Consequently, it was concluded by interested parties outside DOD that those general values should be placed in the balance with the values resulting to national defense from security classifications. The result, so it was felt, would be to declassify some of the equipment and the imagery which was then in existence, resulting in an ultimate net national benefit.

At about this same time, in March 1963, Dr. Harold Brown, then the Director of Defense Research and Engineering, issued a memorandum recommending priority emphasis on establishing an unclassified joint basic research program leading to the de-

velopment of new and existing sensors for non-military uses. Further, Dr. Brown recommended that all sensor materials, which did not involve military or "sensitive type" information, be declassified and released to the scientific and technical community.

In May 1964, Dr. Eugene Fubini, then Deputy Director of Defense Research and Engineering, as a result of the Institute study, Dr. Brown's memorandum, and a further detailed study by a tri-Service group under the auspices of the Air Force Cambridge Research Laboratories, requested the Deputy Assistant Secretary of Defense (Security Policy) to establish an *ad hoc* group to consider the security classification of equipment and data mentioned in the March 1963 memorandum. Dr. Fubini also recommended that this group or another one prepare a joint Service manual covering the security classification of research and development work in remote sensing. A suggested base for this work was a joint policy developed under the auspices of the Joint Chiefs of Staff titled, "Joint Policy for the Classification of Infrared, Visible and Ultraviolet Equipment, Components, and Information," issued in February 1963.

In July 1964, the Director for Classification Management, in the Office of the Deputy Assistant Secretary of Defense (Security Policy), requested the Office of the Director, Defense Research and Engineering, the three Services and the Defense Intelligence Agency to name technical personnel to an *ad hoc* working group. In its earliest deliberations, because of the pressure resulting from the interests of other government agencies and private organizations, the group concentrated on the security classifications to be assigned to airborne infrared scanning systems and imagery obtained from such systems.

An analysis of the Joint Chiefs of Staff policy of February 1963 showed that it applied classifications largely on the basis of the quality of equipment performance in comparison with other systems. For example, the basic standards for classifying at the Secret level were that the equipment could reveal "an operational capability of outstanding tactical value," or "a capability markedly superior to that of existing Confidential equipment of the same general type or class," or the equipment contained "a component part which, because of its use in other equipment, is classified Secret."

At first reading these standards sound all right, particularly when the technical experts on the *ad hoc* group noted that there had to be a finding that unauthorized disclosure of the performance capabilities would result in serious damage to the interests of national defense. But these standards were too inexact by which to measure or evaluate the classification which should be applied to all such systems.

Further, the joint policy provided no criteria for downgrading or declassifying some of the older systems which by that time were obsolete by the critical information involved in military standards. As it was put by a member of the *ad hoc* group: "Everyone was waiting for someone else to act." This was the general situation facing the *ad hoc* working group when it began its work.

In this field of infrared scanners it has been said that every piece of equipment has a military capability. Therefore, while a particular piece of equipment may be obsolete by U.S. military standards, it might be useful to other nations which had not done any research or development of such systems. Also, the working group noted, if one system were declassified and its operating capabilities known, then it would be obvious that the United States had some equipment with greater military capabilities. Not only would it be advisable to classify performance capabilities at some level, but the highly specialized technology necessary to successful production of operational equipment, which had been developed under DOD contracts, had to be considered. Without this knowledge the technical experts agreed that there was a lead time of two years and up from the beginning of a research and development effort to the development and debugging of an equipment of operational quality.

If one were to stop at this point, all these infrared imaging systems probably should be classified and the imagery, too. This would be an easy way out, but it is not nearly good enough to meet our military operational requirements and the insistent requests to make this equipment and imagery available for a multitude of non-military uses, to say nothing of the necessity for applying established classification principles far more precisely.

One of the fundamental principles of a sound classification system is to identify precisely what information warrants protection, and to apply our resources to protecting only that kind of information. In applying this principle, the technical experts, who met during the summer and fall of 1965, readily agreed on the critical elements of infrared imaging systems, namely, the V/H ratio, spatial and thermal resolution.

These elements will be recognized as the critical operating capabilities of infrared imaging systems. It is easy to see that knowledge of these capabilities for any infrared system would reduce or eliminate, to some extent at least, whatever military advantages would accrue to our forces in the field by having this equipment available in a given locality. Knowlege of these capabilities would enable an enemy to judge what we were capable of learning of reconnaissance flights at night, as well as during the day. So long as our capabilities are not known, our forces have some kind of an advantage that is worth protecting. Countermeasures have not been mentioned, but it is obvious what the enemy might do to protect himself if he knew we were using the equipment, and what kind of information the equipment is cable of providing.

When talking about classifying information pertaining to technical equipment, we hear the term "state of the art" used frequently as a measure or standard for classification. There are many levels of state of the art. First, there is the open, publicly known degree of attainment; next, the unknown or classified level of achievement in U.S. systems; next, our knowledge of foreign achievements. Technical intelligence plays a large part in determining state of the

art for classification purposes. It becomes quite involved when we try to determine what we know of foreign developments, what foreigners know of our developments, and what we think foreigners know of what we know of their developments.

For obvious security reasons, this article cannot discuss intelligence estimates. Suffice it to say that our experts, in taking a look at all that has been published concerning infrared imaging systems, particularly the IRE proceedings on infrared in 1959 and the 1962 and 1964 symposia on Remote Sensing, came to the conclusions that:

- The whole world knows the fundamentals of passive infrared scanning imaging systems.
- The whole world knows the United States has developed operational equipment.
- There is a measurable level of attainment which can be deduced from those two facts.

To complicate further the job of deciding what should be classified about these systems is the often-stated fact that all of the significant components for one of these systems can be purchased on the open market. This meant to our experts that any competent group of engineers could obtain the necessary parts and, in a reasonable time frame, could produce an operable piece of equipment. The estimates as to how long this would take varied from one to three years. An independent group of engineers, in a study prepared by Battelle Memorial Institute for the Advanced Research Projects Agency, concluded one to several years depending on the degree of operational excellence desired.

As a preliminary move, our experts decided that the amount of data already published indicated that our military equipment was capable of at least a V/H ratio of .25 radians per second, a thermal resolution of about a quarter degree Centigrade, and a spatial resolution of four milliradians. They accepted this as a reasonable measure of the known state of the art.

As anyone familiar with the workings of these systems knows, this statement of known levels of performance is not the last consideration. There are considerable trade-offs possible which may result in great increases in one parameter at the expense of others. There is a direct mathematical relationship between these factors. To give effect to this trade-off possibility, the experts devised a formula expressing this mathematical relationship. At first it did not include the total field of view (FOV) but, ultimately, it came out as the ratio of the square root of the product of the V/H ratio, expressed in radians per second, and the total FOV in radians over the product of thermal resolution (delta T) in degrees Centigrade and the square of the spatial resolution (alpha) in milliradians.

$$\frac{\sqrt{(V/H)\ (FOV)}}{(\Delta T)\ (\alpha)^2}$$

To put this formula to practical use, the experts entered the data which they felt represented the known capabilities of our military equipment and came out with a figure of 4.5×10^5, termed the "Order of Merit." This to their minds represented a precise, usable figure, an Order of Merit, by which to measure the relative total capabilities of any particular system in comparison with others. Total inherent capabilities above that figure would require classification of those capabilities.

Application of this formula to determine whether a particular system may have operating capabilities requiring classification requires determination of optimum capabilities. The V/H ratio is based on feet per second per foot. The total field of view, the total scan angle, is the double angle from the vertical expressed in radians. Delta T is defined as the "noise equivalent temperature difference" relative to 300° K, and is that temperature difference between adjacent objects which produces at the output terminals of the electronic system an electrical signal of Root Mean Square value equal to the RMS value of the electrical noise of the system. This figure is determined under laboratory conditions when the object radiates as a black body and subtends an angle equal to the spatial resolution (alpha) of the system. Spatial resolution is the fineness of target detail which can be distinguished in the imagery and is defined, for the purposes of the formula, as the ratio of the smallest dimension of the sensitive area of the detector and the effective focal length of the optical system, expressed in radians (milliradians in the formula).

Insofar as I know, this is the first time an attempt has been made to develop a mathematical measure of capabilities as a means for making classification determinations. It is, however, not the only basis for determining whether a particular piece of infrared scanning equipment should be classified. It covers only operational performance capabilities. Also to be considered are other things—manufacturing technology, unique to these systems and essential to successful production of operating equipment; and materials or components representing improvements, unique to these systems or to other infrared equipment, which contribute to the military or defense advantages to be realized from the systems. Items of hardware, including the complete end items, the system package, warrant classification by reason of the classified information which they reveal or which can be obtained from them.

So much for the systems, the hardware. Imagery taken by these systems can reveal much to the expert eye—not from a photointerpreter standpoint as to what can be read from the imagery, but certain of the critical operating capabilities which can be gleaned from technical analysis. Specifically, it is not too difficult to determine, with reasonable scientific accuracy, the thermal and spatial resolutions realized in the particular operation. If those figures are in the classified zone, then the imagery would have to be classified. The main use of the Order of Merit formula lies in deciding whether certain imagery should be classified. As a general rule, if at the time imagery is obtained, the total attained operating capabilities of the equipment result in an Order of Merit below the figure of 4.5×10^5, the imagery would not have to be classified to protect equipment capabilities.

To sum up, DOD Instruction 5210.51 establishes a bench-mark in classification guidance. It applies to the fullest the basic requirement that it is information that is classified. Equipment capabilities are information. In this instruction for the first time a mathematical basis is expressed to assist in making classification determinations of equipment capabilities. Broadly speaking, end items on infrared imaging equipment are classified because of the information they contain and reveal.

Detectors have been developed to the point where they are classified only if they are unique, and represent an advancement which makes the equipment more useful militarily. The kinds of material used have been fairly standardized. The atmospheric windows used, *i.e.*, the 3.5-5 and the 8-14 micron regions, are no longer considered significant, except as they might reveal the purpose of a particular intelligence or reconnaissance mission, so it is generally no longer necessary to classify the fact that an InSb or a Ge: Hg detector is used in a particular system. The time of day or night when imagery is taken is no longer considered significant.

To date DOD has not yet declassified any equipments developed under DOD contract or other systems related to such military systems. Existing systems are being evaluated to determine whether any can be declassified.

Because of their overall military usefulness, DOD considers all airborne passive scanning infrared imaging systems and related technical data to come within the coverage of the State Department's International Traffic in Arms Regulation (the munitions control regulation) and the Expert Control laws. DOD recognizes the possible values of these systems to non-military users and, subject to the overall interests of national defense, has taken the steps mentioned to classify more precisely the information pertaining to those systems. By and large, we believe we have arrived at a sound practical basis for classification which ultimately will make most imagery and some equipment available for non-military uses.

Calendar of Events

Sept. 3–4: Greater Cleveland Air Show, Burke Lakefront Airport, Cleveland, Ohio.

Sept. 4–8: Symposium on Automatic Control in Space, Vienna, Austria.

Sept. 5–9: National Association of Photo-Lithographers Meeting, Boston, Mass.

Sept. 11–13: American Institute of Aeronautics and Astronautics Electric Propulsion and Plasmadynamics Specialist Conference, Antlers Plaza Hotel, Colorado Springs, Colo.

Sept. 11–13: Air Force Association Annual Fall Meeting, "1967 Aerospace Briefings & Display," Sheraton-Park Hotel, Washington, D.C.

Sept. 12–14: Annual Seminar of the American Society for Industrial Security, Ambassador Hotel, Los Angeles, Calif.

Sept. 13–14: Institute of Electrical and Electronic Engineers Meeting, Detroit, Mich.

Sept. 16–17: Midwestern Aviation and Space Exposition, Willow Run Airport, Detroit, Mich.

Sept. 19: National AeroSpace Services Association Sixth Annual USAF Contract Aerospace Service Symposium, Imperial House North, Dayton, Ohio.

Sept. 19–20: Army Munitions Command/National Security Industrial Association Advanced Planning Briefings for Industry, Washington, D.C.

Sept. 19–22: Electronic Industries Association Configuration Management Workshop, Denver, Colo.

Sept. 23–27: American Institute of Supply Association Meeting, Boston, Mass.

Sept. 25–28: Human Factors Society Meeting, Boston, Mass.

Sept. 27–28: National Security Industrial Association Procurement Conference, Washington, D.C.

Sept. 29–Oct. 1: National Institute of Government Purchasing Meeting, Washington, D.C.

Oct. 1–4: American Public Works Association Meeting, Boston, Mass.

Oct. 1–4: National Defense Transportation Association Meeting, Los Angeles, Calif.

Oct. 9–10: 15th Joint Engineering Management Conference, San Francisco, Calif.

Oct. 9–11: Association of the U.S. Army Meeting, Washington, D.C.

Oct. 9–11: Defense Supply Association Meeting, Washington, D.C.

Oct. 9–12: National Business Aircraft Association Meeting, Boston, Mass.

Oct. 10–12: Cleveland-Navy-National Security Industrial Association Scientific and Procurement Conference, Cleveland, Ohio.

Oct. 11–13: Army Aviation Association of America Meeting, Washington, D.C.

Oct. 16–17: Society of Photo-Optical Instrumentation Engineers Laser Range Instrumentation Seminar, Hilton Inn, El Paso, Tex.

Oct. 16–18: Institute of Electrical and Electronic Engineers Aerospace Systems Technical Convention, Sheraton-Park Hotel, Washington, D.C.

Oct. 16–20: 10th Anglo-American Conference, Los Angeles, Calif.

Oct. 17–19: Lubrication Conference, Chicago, Ill.

Oct. 18–19: National Security Industrial Association R&D Symposium, Washington, D.C.

Oct. 23–25: National Electronics Conference, International Amphitheatre, Chicago, Ill.

Oct. 23–27: American Institute of Aeronautics and Astronautics Fourth Annual Meeting and Technical Display, Anaheim, Claif.

Oct. 25–27: Electric Council of New England Meeting, Boston, Mass.

Oct. 29–Nov. 3: Civil Defense Council Meeting, Miami Beach, Fla.

Nov. 1–3: National Security Industrial Association Meeting, Patrick AFB, Fla.

Nov. 1–3: Northeast Electronic Research and Engineering Meeting, Boston, Mass.

Nov. 13–15: Conference on Electrical Techniques in Medicine and Biology, Boston, Mass.

Nov. 14–16: American Society of Tool and Manufacturing Engineers—Regional Exposition, Sheraton-Boston and War Memorial Auditorium, Boston, Mass.

SELECTED DEFENSE DEPARTMENT ECONOMIC INDICATORS

(Dollars in Millions; Manpower in Thousands; Quarters by Calendar Year)

	1966 I	II	III	IV	1967 Jan	Feb	Mar	I	Apr	May	Jun	II
I. Military Prime Contract Awards												
Aircraft	$1,945	$2,989	$2,696	$2,262	$ 784	$ 788	$ 530	$2,102	$ 432	$1,240	$1,377	$3,049
Missile & Space Systems	1,040	987	1,314	861	380	361	489	1,230	300	260	606	1,166
Ships	355	491	876	239	90	418	171	679	72	129	206	407
Weapons & Ammunition	555	1,486	692	940	346	215	257	818	279	518	972	1,769
Electr. & Communications Eqpt.	918	1,574	666	915	377	265	329	971	480	338	1,030	1,848
Other Hard Goods	843	1,842	660	1,029	267	305	343	915	298	362	904	1,564
Soft Goods	709	922	1,078	989	251	193	194	638	171	199	282	652
Construction	207	392	198	150	106	59	67	232	126	160	340	626
All Other	1,406	1,963	2,356	1,639	534	575	496	1,605	517	507	963	1,987
Total (Excl. of work outside U.S.)	7,978	12,646	10,536	9,024	3,135	3,179	2,876	9,190	2,675	3,713	6,680	13,068
Total, Seasonally Adjusted	8,703	10,144	10,716	10,149	3,338	3,849	2,984	10,171	2,920	4,121	3,626	10,667
Work Outside U.S.	521	1,195	856	672	183	112	158	453	227	228	379	834
. Gross Obligations Incurred												
Operations	8,326	9,604	10,426	9,702	3,495	3,226	3,508	10,229	3,664	3,531		
Procurement	4,374	8,539	5,368	5,276	1,738	1,451	1,924	5,113	1,801	2,485		
Other	2,429	3,470	3,453	2,230	823	774	922	2,519	726	1,130		
Total	15,129	21,613	19,247	17,208	6,056	5,451	6,354	17,861	6,191	7,146		
I. Gross Unpaid Obligations Outstanding												
Operations	3,828	3,867	4,792	5,024	5,041	4,892	4,644	4,644	4,761	4,765		
Procurement	18,023	21,944	22,736	23,173	23,134	22,982	22,780	22,780	22,613	22,947		
Other	5,898	6,709	8,051	7,627	7,557	7,469	7,228	7,228	7,159	7,334		
Total	24,749	32,520	35,579	35,824	35,732	35,343	34,652	34,652	34,533	35,046		
IV. Net Expenditures												
Operations	7,689	9,076	8,968	9,087	3,267	3,219	3,516	10,002	3,416	3,335	3,745(p)	10,496(p)
Procurement	3,651	3,886	4,392	4,264	1,680	1,491	1,903	5,074	1,783	1,850	1,702(p)	5,335(p)
Other	2,757	2,647	2,484	3,092	1,015	887	1,277	3,179	918	749	399(p)	2,066(p)
Total	14,097	15,609	15,844	16,443	5,962	5,597	6,696	18,255	6,117	5,934	5,846(p)	17,897(p)
V. DOD Personal Compensation												
Military	3,181	3,249	3,551	3,606	1,200	1,221	1,203	3,624	1,230	1,196		
Civilian	1,937	2,015	2,105	2,135	733	666	764	2,163	700(r)	776(p)	766(p)	2,242(p)
Total	5,118	5,264	5,656	5,741	1,933	1,887	1,967	5,787	1,930(r)	1,972(p)		
VI. Outstanding Payments												
Advance Payments	66	79	90	83				92				
Progress Payments	4,402	4,346	4,750	5,461				5,981				
V Loans	53	51	52	55				112				
Total	4,521	4,476	4,892	5,599				6,185				
VII. Strength (Manpower)												
Military	2,969	3,094	3,229	3,334	3,357	3,368	3,371	3,371	3,371	3,368	3,375(p)	3,375(p)
Civilian	1,088	1,138	1,184	1,230	1,246	1,260	1,268	1,268	1,273	1,274	1,303(p)	1,303(p)

p—preliminary.
r—revised.

Directorate for Statistical Services, OASD (Comptroller)
4 August 1967

U.S.-Australian Cooperative Logistics Arrangements

Leighton A. Cain

Australia, a nation alive to the problem of preparedness in Southeast Asia and the need to provide for its defenses, has made arrangements for the purchase of several hundred million dollars of military products from the United States.

Defense Policy.

Australia's national defense objectives are broadly:

- To provide for the security of Australia and its island territories.
- To pursue close friendship and cooperation with non-communist Asian countries.
- To seek support, particularly of Great Britain and the United States, in promoting cooperative arrangements for collective security in the Southeast Asia area and for the defense and security of Australia.
- To counter communist aggression in Southeast Asia.
- To support the development of the United Nations as an effective instrument of collective security.

Since World War II, and more particularly in recent years, Australia's defense has been characterized by a progressive increase in international defense responsibilities and commitments.

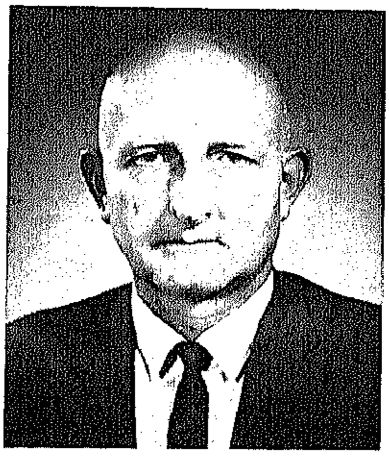
The collective security arrangements in which Australia participates are SEATO (Southeast Asia Treaty Organization), ANZUS (Australia, New Zealand and United States), and Commonwealth defense arrangements, such as ANZAM (Australia, New Zealand and Malaysia).

These are a fundamental part of current Australian strategic thinking and outlook. Much of Australia's defense effort continues to be directed to supporting these alliances in a measure commensurate with its national interests and resources, while at the same time making appropriate provisions for the immediate defense of Australia and its territories in the light of assessed threats.

Defense Program.

The government has followed a policy of progressive development of Australia's armed forces and substantial additions have been made to the defense program in recent years.

In March 1957, the Australian government announced a new defense program which would place emphasis on "mobility, hitting power, and modern equipment." It included a decision to make Australian land and air weapons compatible with U.S. equipment, a marked departure from Australia's traditional military connections with the United Kingdom. In November 1959, a further plan was announced, the main features of which were suspension of compulsory military training, coupled with a 35 percent increase in the strength of the regular army; disbandment in 1963 of the fleet air arm; and reorganization of army operational units on the pattern of the U.S. Army's then pentomic division.



Leighton A. Cain is a Staff Assistant in the Office of the Deputy Assistant Secretary of Defense (International Logistics Negotiations), Office of the Assistant Secretary of Defense (International Security Affairs). He has served in the Defense Department since 1940 in key positions as a supply specialist.

Arrangements were completed in June 1961 for the construction of two new destroyers in the United States, the vessels to be equipped with the most modern offensive and defensive equipment. Agreement on construction of a third destroyer was reached in 1963. In the same year Prime Minister Menzies announced an increase of 15 percent in defense expenditures over the next five years. In 1964 a further large increase in defense spending was announced, and Australia contracted to buy 24 F–111 aircraft.

Australia's acceptance of overseas obligations since World War II, and the deterioration of the situation in Southeast Asia during the last few years, have provided the incentive for improvement of Australia's military forces. A program of accelerated improvement was announced in November 1964. This program included an increase in armed forces strength from 50,000 in 1964 to 75,000 by the end of 1967, through the introduction of conscription for overseas service for the first time in Australian history; and the re-equipping of the services. Toward these ends, Australia's defense expenditures have increased from $480 million in 1963 to $1,120 million in 1967, an increase of 134 percent.

Australia is also a member of the European Launcher Development Organization (ELDO). The facilities at the Woomera Rocket Range, in south Australia, and the technical experience of its staff are being used in a program scheduled to launch a test satellite into orbit by 1969.

Australia recognizes the need for cooperation in world affairs as evidenced by its participation in collective security arrangements and agreements.

U.S.-Australian Cooperative Logistics Arrangements.

A mutual defense agreement between the United States and Australia was signed Feb. 20, 1951. No grant aid, however, was required and all assistance made available has been financed and paid for by Australia, including purchases from the United States under its military sales program.

Since 1951 the United States and Australia have concluded more than a dozen treaty arrangements concerning such matters as tracking stations, communications stations, status of forces, naval matters, mutual weapons development programs, weather stations and security. In addition, cooperative logistics arrangements and credit arrangements have been consummated to cover purchase of defense articles and defense services from the United States. Security procedures for industrial operations were also promulgated through an exchange of defense letters.

During the period FY 1962–1967, Australia placed military sales orders, or commitments to buy, with the United States amounting to several hundred million dollars. The program is concrete evidence of Australian recognition of the necessity for military preparedness and the need for closer U.S.-Australian cooperation in Southeast Asia. The bulk of these sales are under credit arrangements with the United States.

In addition to destroyers and F-111 aircraft, major purchases by Australia have included S-2E, C-130, P-3B and A-4G aircraft, helicopters, armored personnel carriers and other weapon systems.

The current logistic arrangement between Australia and the United States, agreed upon in February 1965, is designed to cover Australian purchases of military equipment for force improvement, as well as for some force maintenance during the period FY 1966–1968.

A cooperative support agreement was also consummated in February 1965. This arrangement permits Australia to obtain logistic materiel and services for its armed forces equivalent in timeliness and effectiveness to that provided the U.S. Armed Forces. Subsequently, individual arrangements were made between the U.S. and Australian Armed Forces to provide such support for specific major weapon systems.

These arrangements include provision for credit of up to $450 million for defense articles and services to be provided through U.S. Government agencies or from private sources in the United States.

A U.S.-Australian defense space research facility has been established in Australia. This activity will engage in a variety of research projects and the results obtained will be available to both countries. It will be a joint operation of the Australian and the U.S. Defense Departments. Australian sub-contractors will share in the construction.

Australia has further contributed to space research by becoming an important base for six tracking stations built for the U.S. National Aeronautics and Space Administration (NASA). The six stations are associated with earth-orbiting satellites, deep space probes, and Project Apollo. The costs of building, equipping and operating the stations are borne by NASA, while the stations are managed, maintained and operated by the Australian Department of Supply.

Summary.

The U.S. Foreign Military Sales Program for Australia represents a manifestation of close U.S.-Australian politico-military interests, a result of the growing Australian recognition of the severity of the Southeast Asia problem, and cooperation in the broadest field of international finance.

Large-scale Australian purchases of U.S. military equipment offer advantages to both the United States and Australia. For the United States, the sale of major items of military equipment contributes not only toward the attainment of important policy objectives, such as increased standardization and commonality of free world military systems and equipment, but it also provides a friendly foreign nation with an opportunity to acquire the best weapons at an economical price while, at the same time, helping to reduce our balance of payments deficit. For Australia, it provides the best weapons at the lowest cost, under favorable financing arrangements, and with assured continued support; it enhances its ability to participate in joint operations and actions with U.S. forces with the commonality of equipment involved; and it opens the door for future joint operation and maintenance activities, co-production projects, and U.S. procurements in Australia.

Navy Lab Tests Inflatable Tent

An inflatable shelter which can be used in areas of extreme heat or cold is being tested by technicians at the Environmental Test Laboratory, Naval Missile Center, Point Mugu, Calif.

Upon completion of testing and evaluation, the structures will be sent to South Vietnam for use by Fleet Marine Forces to house data processing equipment and personnel.

During the testing program, the structure will be subjected to temperatures of up to 135 degrees Fahrenheit and down to minus 40 degrees Fahrenheit in the laboratory's large climate chamber.

The structure is 24 feet square and 10 feet tall. Sections of the superstructure are made of cloth coated with polyurethane. When inflated they provide a wall nine inches thick. Nylon threads between the inner and outer panels of each wall section maintain uniform thickness and rigidity.

Because the walls are made in sections a puncture in one location will not cause the entire structure to collapse. According to the Dewey Corp., manufacturer of the structure, as many as three-quarters of the wall panels can be punctured and the structure will retain its shape.

The universal shelter is being considered for such tactical uses as operation centers, command posts, field dental and hospital use, and for other general utility applications.

R. W. Canon is head of the Environmental Test Laboratory at Point Mugu.

ABOUT PEOPLE

DEPARTMENT OF DEFENSE

The following assignments have been announced by the Defense Supply Agency: **Maj. Gen. John Goshorn**, USA, Dep. Dir., (Contract Administration); **RAdm. Ira F. Haddock**, (SC), USN, Asst. Dir., (Plans, Programs and Systems); **Brig. Gen. John A. Brooks III**, USAF, Exec. Dir., (Technical and Logistics Services); **Maj Gen. Emmett M. Tally Jr.**, USAF, Commander, Defense Construction Supply Center, Dayton, Ohio; **Capt. Grover C. Heffner**, (SC), USN, Commander, Defense Industrial Supply Center, Philadelphia, Pa., with the rank of rear admiral; and **Col. Robert I. Ciraldo**, USA, Inspector General.

RAdm. Elliott Bloxom, USN, has been appointed Dep. Commander (Operations), Military Traffic Management and Terminal Service.

Capt. John A. Davenport, USN, has been assigned Chief, Business & Labor Div., Office of Asst. Secretary of Defense (Public Affairs).

DEPARTMENT OF THE ARMY

Brig. Gen. William A. Becker is the new Dep. Dir., (Research and Laboratories), Army Materiel Command. He relieved **Col. Harvey E. Sheppard**, who served as acting Dep. Dir. from October 1966.

The following assignments have been announced by the Army Combat Developments Command, Fort Belvoir, Va.: **Col. Ernest W. Chapman**, Dep. Chief of Staff (Development); **Col. William S. Barrett**, Dir. (Plans); **Col. Charles B. Hazeltine Jr.**, Dir. (Evaluation); **Col. Charles T. Caprino**, Comptroller; **Col. James T. Avery Jr.**, Commanding Officer, Institute of Special Studies; **Col. Norman Farrell**, Commanding Officer, Institute of Land Combat; **Col. Francis J. Kelly**, Commanding Officer, Combat Support Group.

Col. Thomas W. Mellen is the new Dep. Dir. (Development), Office of Research and Development, U.S. Army Headquarters, Washington, D.C.

Lt. Col. Joseph J. Rochefort Jr., has been assigned as Project Manager, Engine Generators, at the U.S. Army Mobility Equipment Command's Engineer Research and Development Laboratories, Fort Belvoir, Va.

DEPARTMENT OF THE NAVY

VAdm. Bernard A. Cleary has been assigned as Dir., Program Planning, in the Office of the Chief of Naval Operations.

RAdm. Richard B. Lynch has succeeded **RAdm. William A. Sunderland** as Commander, Hawaiian Sea Front-

(Continued on page 30)

Paul R. Ignatius, who has served as Assistant Secretary of Defense (Installations and Logistics) since 1964, has been nominated to be the new Secretary of the Navy. He succeeds Paul H. Nitze who was appointed Deputy Secretary of Defense. Mr. Ignatius has served with the Defense Department since 1961 when he became Assistant Secretary of the Army (Installations and Logistics).

Admiral Thomas H. Moorer was sworn in as Chief of Naval Operations on Aug. 1 relieving retiring Admiral David L. McDonald. Prior to the new assignment he served as Supreme Allied Commander Atlantic under the North Atlantic Treaty Organization, and as Commander in Chief, U.S. (unified) Atlantic Command and the U.S. Atlantic Fleet. Admiral Moorer is a 1933 graduate of the U.S. Naval Academy.

Thomas D. Morris, nominated to the position of Assistant Secretary of Defense (Installations and Logistics) to succeed Paul R. Ignatius, returns to the post in which he served from Jan. 1961 to Dec. 1964. Mr Morris has been Assistant Secretary of Defense (Manpower) since Oct. 1965. He was a member of the New York firm of Cresap, McCormick and Paget prior to the Manpower appointment.

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DEPUTY
BG Lloyd B.

COL Robert J.

ASSISTANT CHIEF OF INFORMATION FOR POLICY
COL George R. Creel 74359 2E646

Office of Chief of Information is located
in the Pentagon, Washington, D. C.
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PLANS BRANCH		
COL Everett O. Post	54462	2D636
OPERATIONS BRANCH		
LTC Douglas D. Grinnel	57874	2D640

PUBLIC INFORMATION DIVISION		
COL William Schabacker	56688	2E641
NEWS BRANCH		
LTC Edward Comer	72351	2E641
AUDIOVISUAL BRANCH		
LTC John R. Swee	53007	2D644A
SPECIAL PROJECTS BRANCH		
LTC Phillip H. Stevens	71747	2E641

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INFORMATION FOR PROGRAMS
COL John T. English 74269 2E646

LOS ANGELES BRANCH
COL Jack G. Westbrooke
6087 Sunset Boulevard
Hollywood, California 90028
213 462-7215-7218
AUTOVON 898-3400 Ext 649

NEW YORK BRANCH
COL Alfred J. Mock
663 Fifth Avenue
New York, New York 10002
212-MU8-7572
AUTOVON 552-3310

COMMUNITY RELATIONS DIVISION
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FIELD SUPPORT BRANCH
LTC Edward M. Bradford 72707 2D630

COMMAND INFORMATION DIVISION
COL Charles R. Thomas 53952 2E629

PLANS BRANCH
MAJ Walter Shiro 78221 2E629A

TRAINING MATERIALS BRANCH
LTC Samuel H. McKenty 53216 2D628

INFORMATIONAL SERVICES BRANCH
LTC Salvatore Fede 54635 2D600

MEETINGS AND SYMPOSIA

SEPTEMBER

International Symposium on Information Theory, Sept 11–15, at Athens, Greece. Sponsors: Air Force Office of Scientific Research, Information Theory Group of the Institute of Electrical and Electronics Engineers and the International Radio Scientific Union. Contact: Lt. Col. B. R. Agins, (SRMA), Air Force Office of Scientific Research, 1400 Wilson Blvd., Arlington, Va., 22209, Phone (202) OXford 4-5261.

International Symposium on Materials—Key to Effective Use of the Sea, Sept. 12–14, at the Statler-Hilton Hotel, New York, N.Y. Co-sponsors: Naval Applied Science Laboratory and the Polytechnic Institute of Brooklyn, N.Y. Contact: D. H. Kallas, Associate Technical Director, Naval Applied Science Laboratory, Flushing and Washington Avenues, Brooklyn, N.Y. 11251.

Advanced Composite Structures Symposium, Sept. 19–21, at the Hilton Hotel, Denver, Colo. Sponsor: Air Force Materials Laboratory. Contact: Mr. Tomashot, (MAC), Air Force Materials Laboratory, Wright-Patterson AFB, Ohio 45433, Phone (513) 253-7111, Ext. 55317.

Second International Buoy Technology Symposium and Exposition, Sept. 18–20, at the Washington-Hilton Hotel, Washington, D.C. Sponsor: Marine Technology Society with participation by American Meteorological Society. Contact: Buoy Committee, Marine Technology Society, 1030 Fifteenth St. NW, Washington, D.C. 20005, phone (202) 296-6773.

Eighth Symposium on Physics and Nondestructive Testing, Sept. 19–21, at Dayton, Ohio. Sponsor: Air Force Materials Laboratory, Wright-Patterson AFB, Ohio 45433.

Seventh Annual National Conference on Environmental Effects on Aircraft and Propulsion Systems, Sept. 25–27, at the Nassau Inn, Princeton, N.J. Contact: Robert A. Reale, Naval Air Turbine Test Station, 1440 Parkway Ave., Trenton, N.J. 08628, Phone (609) 882-1414, Ext. 224.

Joint Power Generation Conference, Sept 24–28, at the Statler-Hilton Hotel, Detroit, Mich. Co-sponsors: Institute of Electrical and Electronics Engineers and the American Society of Mechanical Engineers. Contact: Carl Shabtach, General Electric Co., Schenectady, N.Y. 12301.

Fourth International Conference on **Atmospheric and Space Electricity**, Sept. 29–Oct. 6, at Lucerne, Switzerland. Sponsors: Air Force Cambridge Research Laboratories, Army, Navy, National Scence Foundation and National Aeronautics and Space Administration. Contact: M. B. Gilbert, (CRTE), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01731, Phone (617) 274-6100, Ext. 3633.

OCTOBER

Twenty-second Annual Transportation and Logistics Forum, Oct. 3–6, at the Biltmore Hotel, Los Angeles, Calif. Sponsor: National Defense Transportation Association. Contact: Les Richards, 3416 S. La Cienega Blvd., Los Angeles, Calif. 90016.

Conference on Reinforced Metal Matrix Composites, Oct. 10–12, at Wright-Patterson AFB, Ohio. Co-sponsors: Air Force Materials Laboratory and the University of Dayton.

Eleventh Annual Organic Chemistry Conference, Oct. 12–13, at Natick, Mass. Sponsors: National Academy of Science-National Research Council, Advisory Board on Military Personnel Supplies, and Organic Chemistry Laboratory, Pioneering Research Div., Army Natick Laboratories. Contact: Dr. L. Long Jr., Head, Organic Chemistry Lab, (PRD), Army Natick Laboratories, Natick, Mass. 01760, Phone (617) 653-1000, Ext. 414.

Conference on the Exploding Wire **Phenomenon**, Oct. 18–20, at Boston, Mass. Sponsor: Air Force Cambridge Research Laboratories. Contact: W. G. Chace, (CRFA), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01730, Phone (617) 274-6100, Ext. 4926.

Mass Transport in Oxides Conference, Oct. 22–25, at Gaithersburg, Md. Sponsor: Advanced Research Projects Agency. Contact: Dr. John B. Wachtman, Inorganic Materials Div., National Bureau of Standards, Washington, D.C. 20234, Phone (301) 921-2901.

Conference on Unguided Rocket **Ballistics Meteorology, Oct. 30–Nov. 1**, at New Mexico State University, Las Cruces, N.M. Sponsor: Army Electronics Command. Contact: B. E. Britain, Atmospheric Sciences Office, Atmospheric Laboratory, USA-ECOM, White Sands, N.M. 88002, Phone (505) 338-1006.

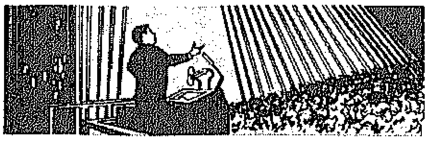
NOVEMBER

1967 Conference on **Speech Communication and Processing**, Nov. 6–8, at Boston, Mass. Co-sponsors: Air Force Cambridge Research Laboratories and the Institute of Electrical and Electronics Engineers. Contact: C. P. Smith, (CRBS), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01730, Phone (617) 274-6100, Ext. 3712.

Applied Superconductivity Conference, Nov 6–8, at Austin, Tex. Sponsors: Army Research Office, University of Texas, NASA, Air Force Office of Scientific Research and the Office of Naval Research. Contact: W. H. J. Hartwig, Electronic Materials Research Laboratory, University of Texas, Austin, Tex. 78712.

1967 Conference on **Speech Processing**, Nov. 13–15, at the Hotel Somerset, Boston, Mass. Co-sponsors: Air Force Cambridge Research Laboraories and the Institute of Electrical and Electronics Engineers. Contact: Calwdell P. Smith, (CRBS), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01731, Phone (617) 274-6100, Ext. 2712.

Decomposition of Organo Metallic Comp. to Refractory Ceramics, Metals and Metal Alloys, Nov. 28–30, at the Sheraton-Dayton Hotel, Dayton, Ohio. Sponsor: Air Force Materials Laboratory. Contact: Dr. Lynch, (MAMC), Air Force Materials Laboratory, Wright-Patterson AFB, Ohio 45433, Phone (513) 253-7111, Ext. 54145.



FROM THE SPEAKERS ROSTRUM

Address by Hon Robert H. Charles, Asst. Secretary of the Air Force (Installations & Logistics), at the Annual Meeting of the Forging Industry Association, White Sulphur Springs, W. Va., May 26, 1967.

Product Lead Time Problems

As you well know, we have been through some trying times together in satisfying our production needs for Southeast Asia. Despite my long background in the aerospace industry, I for one did not fully appreciate the criticality of forgings in such a situation.

Early in 1966, we were confronted with a logistical paradox. While we sought greater program flexibility and accelerated production, most of our system contractors were quoting longer lead time which translated into slipped delivery schedules. Our analysis of the problem indicated that forgings were the pacing items, and that their lead times had doubled, typically, in the previous year.

To come to grips with this problem, a meeting was called in the Pentagon last October with representatives of the aerospace and forging industries. Your counsel and cooperation then, and in the months following, have been most gratifying, and I thank you therefor. Perhaps the most important accomplishment of these efforts has been a much clearer understanding of each other's problems. It has become evident that the finger could not be pointed solely at the forging industry. There were actions that had to be taken by the users and the Government as well. Some 12 recommendations were listed in the final DOD-industry report, and we have attempted to follow these up on a continuing basis.

I do not, by any means, want to imply that we have the problem licked, but progress is being made. The most recent reports on forging lead times, as reflected in surveys by the Aerospace Industries Association (AIA), indicate a leveling off of the rising trend, with improvement in many areas. I like to think that our joint concern has had a lot to do with this improvement.

My reference to the AIA surveys brings me to a major point I want to leave with you today. Lead times for various types of aerospace quality forgings are shown as ranging from 11 to 16 weeks as of August 1965, and from 24 to 31 weeks as of March 1967. We are advised that the 1965 figure may be depressed because of unusual conditions at that time, and that the 1967 figure may be high due to the boom in aircraft production. The norm is indicated to be somewhere between the two levels. If we accept this, it means that we should normally expect to wait from 17 to 24 weeks for a forging. Four to five and one-half months! Even after receipt, a difficult and time-consuming machining job may be required to obtain the precision needed for the final part. There is some argument as to these numbers, but in any event I believe that we can do better—in fact, if we don't do better in the future, we may find forgings replaced by parts made by other processes. Even today, a great deal of development effort is being expended in this direction.

Hon. Robert H. Charles

Earlier this year I publicly discussed what I considered to be the adverse effects of long production lead times: they limit our response to changing world conditions and to the rapidly shifting requirements of defense, increase the possibility of accumulating unneeded or obsolescent inventories, and inhibit modernization of our forces. This accumulation of unneeded or obsolescent inventories deserves further exposition.

One of the determinants of force structure is the need for an existing pool of replacement airplanes of each type, so that those lost in combat or otherwise can be replaced at once. We must have enough to take care of attrition under the most adverse circumstances.

For example, let us assume a situation calling, at all times, for a minimum of 500 airplanes of a particular type, excluding the replacement pool. Let us also assume that this airplane is currently being produced at the rate of 15 a month, and that the maximum attrition rate, under the most adverse combat scenario, is 25 a month. Thus, the maximum net loss is 10 a month.

Now, if the production lead time—from go-ahead to delivery—were 20 months (which is faster than some aircraft today), we must have a replacement pool of 10 airplanes times 20 months, or 200 airplanes, in order to assure ourselves that our combat-ready aircraft will never fall below 500. On the other hand, if the production lead time were 12 months, for example, we would need a replacement pool of only 10 airplanes times 12 months, or 120. Thus, by reducing the lead time from 20 to 12 months, we could reduce our required inventory by 80 airplanes. If we apply this arithmetic to a fighter which costs $3 million, we are talking about saving $240 million, with no degradation of military posture, simply by reducing the lead time from 20 to 12 months.

You recognize, of course, that the assumptions in this example are over-simplified; but I think you can see why I consider long production

lead times a major problem, even without considering their two other adverse effects; *i.e.*, they limit our response to changing conditions and requirements, and inhibit force modernization.

Obviously, the forging industry, with lead times between four and five and one-half months, can make only a partial contribution toward a lead-time reduction of eight months, as assumed in the example. But quality forgings, without which none of our advanced aircraft would be flying today, are of critical importance to defense products and, thus, their portion of the lead time must be examined to see if improvements can be made. I think you will agree that there are techniques and practices currently in use in many forging plants (and in other industries, too, for that matter) that have not changed in the past 20 years. This is hardly compatible with the so-called "age of automation" in which we are now living. A writer in the *Harvard Business Review* recently raised the question in even broader terms, and indicated that our overall position as world leaders in industrial technology is deteriorating. He implies that we are doing a mediocre job of coping with and taking advantage of automation.

Extensive efforts must be made to accelerate our basic manufacturing processes and, at the same time, provide maximum production flexibility. We should consider changing our thinking with respect to material control, material handling, and production scheduling to terms which reflect a continuous manufacturing operation and flow of finished parts with built-in flexibility, rather than a process-by-process scheduling of individual parts. This is the kind of production that our economy calls for today. With the high cost of labor, equipment and space, the really successful producer will be the one who gets the maximum possible output and quality from the resources he has available.

Our Harvard expert says that the task is to:

"Make an increasing variety of products, on shorter lead times with smaller runs, but with flawless quality. Improve our return on our investment by automating and introducing new technology in processes and materials. . . . Mechanize, but keep your schedules flexible . . ."

He draws a well defined distinction between this concept and the old term, "mass production," which called for large volumes, low cost, and barely acceptable quality. The point is well taken, I think. We have arrived at a stage in our industrial development that is not fully recognized by many production managers. Most managers recognize the difference between shop and mass production operations, but the more sophisticated "system that can quickly adjust schedules, get new products out fast, take advantage of new technology, and produce a wider variety of products from limited facilities" represents a new idea to most of these same managers. In the forging business, it presents a real challenge, but also an opportunity.

Investment in New Process Development and Facilities

To accomplish this, substantial investments must be made in new process development and in facilities which apply advanced production techniques. While such advancements will certainly benefit defense programs, they will also benefit commercial products and may very well be the life blood of the industry in the future. Corporate risk investment is, therefore, called for. It is easy enough to sit back in a seller's market and ignore progress when the buyer comes to you; but when the economy turns, it is usually the aggressive operator who survives.

This leads me to another point that I should make. Probably you were waiting for it. That is, the question of government financing and ownership of manufacturing facilities. From the standpoint of the companies represented here, I suppose your position would be divided between the "haves" and "have nots." My own position, however, unequivocally favors private ownership. This is the only position that one can take in a true free enterprise system and, in spite of some other tendencies rampant in our society, I for one believe that this is the overriding reason for the unparalleled success of the U.S. economy.

But there are a great many government-owned facilities, including heavy forging presses; and for the benefit of the "have nots" referred to earlier, I feel I should elaborate on our policy and on our current situation.

Our basic policy is that industry will provide all facilities needed to support defense production programs. Like all policies, however, provision is made for exceptions in this case, for situations involving high-risk defense programs impracticable for industry to support, and where substantial cost savings can be obtained. When we embarked on the heavy press program in the early 1950s, the only then conceivable use for that equipment was defense production; and you will remember that our defense budget was cut to only $9.8 billion in 1948, and remained at $14 billion or below until Korea. In fact, annual sales of the aerospace industry to the Government averaged less than $2 billion in the three pre-Korea years of 1948–50, as compared to nearly $15 billion in each of the last 10 years. We had not recognized the nature of the cold war or of our responsibilities of world leadership.

Under those circumstances, it would have been most imprudent for industry to have built those presses with its own money; although hindsight, as is so often the case, would have rendered a different verdict. But today, the situation is entirely different. We have for some time recognized the requirements of the cold war—not just Southeast Asia and there is a booming commercial market for aircraft. Under these circumstances, I can only say that the application of our basic policy is going to be extremely firm with respect to new facilities, and we are going to seek every possible means of divesting ourselves of existing facilities for which government ownership is not required to protect current or emergency requirements.

I hope this will help to clarify some of the recent reports that DOD has come up with a new policy regarding the provision of facilities. This pol-

icy is not new, and I believe that our contractors are well aware of this. We have, for many years, been working to shift the burden for support of defense programs to private industry. I apologize for using the word "burden." It is not a burden; it is an opportunity. And I think we have made good progress in this effort. As an illustration, you might be interested in knowing that during the Korean buildup in 1951, the Air Force expended some $1.2 billion for facilities to support its production programs. In FY 1967, with a comparable military buildup, our facilities costs are about one-tenth of that. One reason for this shows up in aerospace industry plant expenditures. In 1949, they were estimated at about $50 million, in 1951 about $150 million. In 1967, the figure is now projected at $830 million. I have not seen comparable figures for the forging industry, but I have no doubt but that they would show a similar trend. Another indication of our progress is in the number of Air Force-owned, contractor-operated plants. In 1961, we had 74. Today we have 50, and several of these are in the process of disposition.

So, you see our present position on this problem is not really new, and there is no conceivable way that profits from commercial production can be affected by a radical new facilities policy, as one reporter speculated, simply because there is no new policy. The point I want to get across, however, has to do with new emphasis and positive thinking in industry that places medium and long-term government business on the same basis as commercial business as far as plant and equipment are concerned. When Boeing gets an order from TWA for airplanes, they do not ask TWA for the facilities to do the job. Likewise, when a forging company gets an order from a commercial producer, he knows that he must come up with the necessary resources or forfeit the job. Why should similar government business be any different?

The Economics of the Big Press

With respect to the proposed 200,000-ton press, as I have said before, this is a prime example of an advanced national resource which is expected to benefit both defense and commercial business. It should have a long economic life which would permit the amortization of its cost over a reasonable period of time in accordance with normal accounting procedures. There appears to be no reason why the risk of such an investment cannot be spread sufficiently in time, and among its direct customers if necessary, so that it can be provided without direct government support.

Let's take another look at the economics of this press, estimated to cost $60 million. I mentioned earlier this year an industry study which indicated that it could have reduced the cost of manufacturing 200 C-5s by nearly $70 million. Since the forgings themselves are estimated, with the press, to cost about $11 million, this represents a six-fold saving on each part forged by the big press.

Recently I noted an article in which it was estimated that there might be $30 to $40 million worth of business available for such a press each year. Thus, assuming the aforementioned six-fold saving, on an annual volume of $35 million, this press will save the customer $210 million. Certainly, in my opinion, the company or companies which provide this kind of the end of 1966, their average depreciated value of facilities was $480 million, or 2.12 times their average net worth of $226 million; their commitments to additional facilities (excluding supersonic transports) averaged $544 million or 2.4 times their net worth; and their present facilities plus commitments averaged 4.5 times their net worth. Take some elements of the aircraft manufacturing business. Boeing's existing depreciated facilities, plus commitments, currently exceed its net worth, and this does not reflect its commitment, estimated to be at least $500 million, to develop the 747.

Spreading the Risk

But let's assume that, all factors considered, this press is too much for one company. I ask again, what's wrong with spreading the risk and forming a consortium or joint enterprise for this purpose. In fact, if several companies, rather than only one, have an interest in it, there is the possibility that its utilization may be higher. In any case, I do not agree that competition for the parts produced by the press should inhibit competing companies from joining

I see in the big press a striking parallel. One of the forging companies would finance as much as its corporate judgment dictated and would operate the press. The balance would be provided by those companies which used its products, and each would be entitled to a share of the time indicated by the funds thus provided. I would expect that the profit rate to the forging company, on parts produced for customers having a financial interest in the press, would reflect the degree to which the forger had committed his own funds, and I would further expect that the forger would pay something to those companies if the time spent in producing parts for non-members exceeded the forging company's *pro rata* investment.

In brief, the answer is not, as one aerospace executive is reported to have said, one of government subsidies. It is finding a way to avoid government subsidies. Make no mistake. I believe in government subsidies as much as anyone, where the national need is clear and where there is no practicable way in which it can be accomplished without subsidy. The airlines themselves are a case in point. So were the heavy presses of the early 1950s. I do not get that feeling with respect to the big press.

So I fail to see, if in fact this press will do what industry claims it will do, why industry does not finance it. And I suggest that the discipline inherent in making a profit is a marvelous arbiter. If, bearing in mind the priorities of competing demands for capital, there is a profit to be made in this press, then it will be built. If there is not, then it won't be, at least not by private industry. And if this turns out to be the case, I imagine the Government will find little profit in it either.

Features of Private Ownership

There is another wonderful feature of the private ownership of production equipment: profit can be established on a basis of efficiency, and of value to the customer, in a free market. When the customer owns these facilities, profits are "administered," if you will, and they do not accurately measure or reward efficiency. Further, because of the reduced risk, profits are properly lower than in industries where the manufacturer provides the facilities. They may even be below the point where they provide the wherewithal for research, for competent personnel, for all the other things needed for a thriving industry. So we have a chicken-and-egg problem. Government furnishing of facilities means low profits means government furnishing of facilities means low profits, etc.

Again I suggest that you get out of this rut, just as fast as you can. We will all be better off.

Now I recognize that, if only one such large press is built, the company owning it will have at least a semi-monopoly on these types of forgings. Its profits, therefore, may be subject to some limitation. And although I detest monopoly, the profit in that case should be adequate to reflect the considerable risk involved and, as indicated, to assure the resources for research, for competent personnel, and for all the other prerequisites of a healthy industry.

As a parting thought, I would like to touch briefly on some statistics that may give you a little different insight into that old saw about lack of stability in defense business. In the years 1961 through 1966, annual defense sales of the aerospace industry remained relatively level in a range between $14.5 and $16.8 billion. In fact, for the 10 years 1958 through 1967, such sales have never been below $13 billion. This talk about instability in governmental sales is true only in the context of sales above this figure, not below. During the same period, incidentally, non-defense sales increased from $3.5 to $5.8 billion. Relating this to your own business, in the years 1964, 1965 and 1966, the Forging Industry Association reports that about 30 percent of all forging shipments were made to aircraft and parts manufacturers. The next largest user of forgings was the automotive industry at about 20 percent.

Perhaps there is room for some change in the average forger's concept of the importance of defense business in his corporate growth plan.

Army Engineers Launch Fight Against Solid Waste Pollution Of Waterways

The U.S. Army Corps of Engineers has launched a nation-wide program to increase protection of navigation channels from impairment by illegal deposit of industrial wastes containing solid materials into navigable waterways.

Engineer Corps field offices have been instructed to seek out violations and apply uniform enforcement standards aimed at:

- Complete elimination, where feasible, of the discharge of industrial wastes that reduce the capacity of navigation channels.
- Reimbursement to the Government by violators for dredging costs attributable to deposition of industrial wastes.
- Obtaining agreements with industries that will protect navigation rights and provide for compensating the Government for dredging costs where illegal discharges cannot be halted immediately.

The Army's jurisdiction is limited by Federal statutes to the impairment of navigational channel capacity caused by suspended solids in industrial wastes directly discharged into navigable waters. The Corps has no authority over impairment of such channels caused by refuse matter flowing from streets and sewers and passing into navigable waters in a liquid state.

Actions within the Corps' jurisdiction will be taken in cooperation with the Federal Water Pollution Control Administration (FWPCA), the states and other agencies having jurisdiction over water pollution. Corps field offices will consult with regional FWPCA representatives wherever dredging to remove channel-clogging wastes has a water pollution impact.

The program will include a nationwide survey to identify violations. Also, the Corps' Chicago district has a study under way to develop techniques and criteria for determining the amount of suspended solids contained in industrial plant waste discharges.

Weapon System Readiness Through Logistics

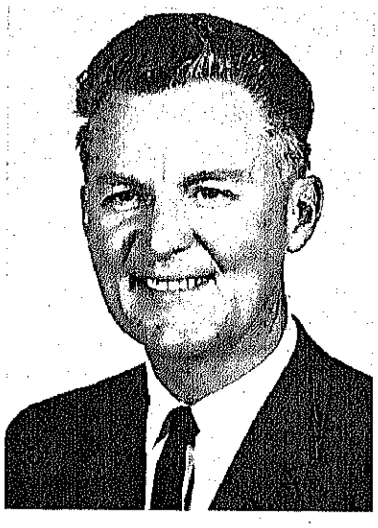
Colonel James F. Mothersbaugh, USAF (Ret.)

The term "logistics" might be compared to "iceberg" as to implications. In both instances there is much more in existence than is readily apparent. What contribution can logistics make to a weapon system? When must logistics be considered to enjoy alleged benefits of weapon system readiness? What can be done to improve logistics? As a matter of fact, would you please define logistics? These are the more searching type questions received by practicing logisticians and those who have retreated to the second line of offense, that of teaching or crusading for logistics improvements.

Since World War II great strides have been made in technology advancement. Breakthroughs in scientific as well as fabrication processes have placed highly sophisticated and correspondingly complex weapon systems and countermeasures within the state of the art, and many within our inventory. Unfortunately, management schools of discipline, the methods, procedures and techniques necessary to acquire and logistically support these technological achievements have not enjoyed the same degree of progress. It must also be acknowledged that logistic support, not enjoying the glamour possessed by technology, has not received a comparable amount of top management attention, at least not with the enthusiasm and perfection of technology.

Many significant changes have occurred in the concept of weapon system acquisition, *i.e.*, the prototype test era (fly before you buy), the concurrency concept (buy before you fly), the four-step life cycle conditional descision procedure and, more recently, the total package procurement with its attendant Government-contractor "disengagement" policy, all of which have required significant reaction from logistic support functions in order to fulfill the in-service support mission. Many incremental, improvised, and sometime frantic stop-gap measures have been implemented by functional logistic support agencies to accommodate these radical new approaches to acquiring the best performing weapon system, at the most economic cost, within the time period it could be effective.

Logistic management personnel and top defense planners might well be criticized for not having devoted more research and development emphasis to the logistic planning and support function, to have ensured a comparable basis for logistic action rather than reaction, to accommodate these new acquisition concepts. If improvements in logistical capabilities are to keep abreast of acquisition and operational needs, it becomes necessary that top level management planners and decision makers, in other than the logistics field, know the functions and elements comprising logistics, and lend their support to the logistic cause during the analysis, review and decision-making process. This article will attempt to identify the functions involved in logistics, some of the significant elements worthy of intensified management attention within those functions and, hopefully, provide an appreciation of the need for and the scope of logistic involvement early and continuously in the weapon system acquisition process.



Colonel James F. Mothersbaugh, USAF (Ret.), is serving as a consultant to the Defense Weapon Systems Management Center, Wright-Patterson AFB, Ohio. His last two assignments prior to retirement from the Air Force were Deputy Director of Logistics for the B–70 and B–58 Programs, and Chief of the Logistics Department at the Defense Weapon Systems Management Center.

Definitions

Maybe a good place to start the discussion is in regard to some of those latent entities that lurk in the filmy shadows of the all embracing term, "logistics." Logistics could be defined as:

> **The planning and acquisition from initial concept for the services necessary on hardware and software to attain and sustain a specific support requirement or need.**

There are no formal institutions or Service schools that graduate a logistician, with qualification credentials entitling hi

pole in the weapon system tent that would dictate the combat readiness date of the system, if not its actual activation date.

While there may be many definitions of logistics, program/project management logistics is a composite of several functional disciplines familiar to most everyone associated with the Military Services and can be identified as: maintenance, supply, procurement, transportation, personnel, facilities and their attendant reporting and documentation methodologies. Under these functional disciplines will be further identifications of elements and tasks that collectively fulfill the complete logistic requirement of an individual weapon or support system, *e.g.*, provisioning of spare components and repair parts, source coding of reparable items and levels of repair authorized, common item support, technical orders, high-value item identification and control, ground support equipment, material improvements, packing, preservation, warehousing, inspection, servicing, skill requirements, training devices and curriculum, manning quantities, etc.

Within the functions, elements and tasks of the total logistic requirement and its progression from concept formulation to phase-out from the inventory, there are actions which can proceed in parallel, and those that must suffer the dependency of series progress subsequent to some particular action completion. Something common to all of these ultimate actions is their need for early planning considerations, and progressive refinement to further define more specifically logistics requirements as visibility improves further down the weapon system life cycle.

Let us review some of the more important logistics functions starting with the most vital one, maintenance. Our review will not be in comparison of cost, importance of precise planning and control to assure the composite product will make its appearance on a predetermined "need date," nor the degree of time, effort, energy, or brains necessary to attain that remarkable achievement. Rather, it will be from the point of view that maintenance is the fusion point of all those endeavors. A deficiency in any one of the contributory functions, elements, or tasks we will discuss, whether within the logistics realm or external to that function, will require maintenance to brace itself for the inevitable bow wave that is headed its way.

Maintenance

Assume, momentarily, that maintenance is the dependent function within logistics, that all other logistic functions, elements and tasks are dressed upon for time-on-target fusion of their action inputs. Then let us delay, temporarily, further discussion of other logistic items, in order to address ourselves to the time sequencing of the weapon system acquisition cycle that must first consider this maintenance function. Concept formulation is generally the earliest planning phase of concern to weapon system managers.

Concept formulation addresses itself to feasibility and cost-effectiveness studies of various approaches to fulfill a stated military requirement and, possibly, weapon and subsystem analysis studies, the ultimate objective of which is fundamentally two-fold: first, to select the best mix of system feasibility approaches in or within development capability; and, secondly, to provide a basis of conditional decision to establish a program baseline configuration in order to proceed into engineering or operational system development in the contract definition phase.

The extent of logistical elements input appropriate for feasibility consideration in this early life cycle phase is proportional to, and somewhat dependent upon, the state of the art, or the degree of development yet required on the basic weapon system. For example, a new cargo aircraft would include concept, feasibility, and specific itemized requirements in considerable detail on most logistic functions and elements, because previous similar systems could provide specification data for requirements, identification and analysis purposes. On the other hand, maintenance of a space rendezvous station would require extensive development action, spawning a multitude of logistic problems not previously encountered and for which no, or possibly only limited, test simulation experience data was available. Under the latter condition, the minimum logistical ingredient essential would be a maintenance concept, upon which ultimately could be constructed the other functions and elements of logistics requirements. As progress continues down the life cycle, succeeding actions in logistics can and must become more specific and detailed.

The development and production baselines are the flood gates in the weapon system life cycle that unfold a multitude of complex and intermeshed logistic actions. The maintenance concept established in the concept formulation phase must identify whether conventional methods of maintenance will be employed, or if development of a new capability is required. Specific requirements must be stated such as:

- Turn-around time for relaunch of the weapon system, and/or the readiness rates expected. This could measure the supportability and maintainability characteristics of the end article.
- Utilization rates projected could quantify the minimum use levels, with factors to consider for increased utilization which would allow tactical flexibility and growth for new targeting and mission requirements.
- Fall-out rate of the end items could be used to measure the effect of use on readiness and reliability attainment.
- "Manhours per flying or readiness hour" being a measurement of operational costs of maintenance at a specified use or rate level, at a given mean-time-to-repair (MTTR) and mean-time-between-failure (M-TBF).

The foregoing requirements are the most significant considerations for total logistic weapon system measurement. Some other subordinate factors for cost-effectiveness and trade-off consideration are:

- Maintainability expressed in maintenance manhours per flying or readiness hour for subsystems and select components.
- Mean-time-to-repair of the subsystems and select components and accessibility thereto within the weapon system itself.

● Reliability stipulations expressed in mean-time-between failure of the subsystems and their major components.

● Maintenance personnel basic knowledge prerequisites prior to specialized training.

● Specialized training necessary and quantity of personnel to receive that training.

● Minimum training devices essential to the transfer of skill knowledge necessary to attain and sustain maintainability requirements to be designed into the weapon system.

If cost, schedules and operational effectiveness are to be more fully exploited, the establishment of early fundamental logistic cornerstones, such as the maintenance concept, should have the inputs of the "in-Service" maintenance engineer, as distinguished from the development design engineer. Normally it is the in-Service engineer who is responsible for weapon system readiness, once it has been fielded. Whether by design or default, the weapon system in-Service support agencies are not, at this writing, importing the knowledge and influence of their composite potential to the critical concept formulation analysis and decision-making phase. Attempts to exert this influence on design at the headstream source, by persuasion rather than authority, is thwarted by insufficient upper management attention or understanding of the downstream implications. In the frenzy or under the pressures to get development, design, and hardware in being, subsequent support problems predicted three to four years hence have traditionally not been considered too pressing by upper echelons of decision-making management. For instance commercial industry has only recently (last eight to 10 years) begun to recognize logistics in early planning rather than an after-the-sale, design configuration necessity.

A most effective method of insuring logistic support to a weapon system is by insisting upon logistics involvement in early planning actions, and by the organizational placement of logistic managers on a comparable level with other program/project manager office staff agencies. Without this stature, responsibility and voice, many elements of logistics will be delegated "out of sight" several tiers down the organizational chain and fragmented under other staff agencies.

The contract definition effort for the logistic function of maintenance requires expansion, both qualitatively and quantitatively, in the Request For Proposal (RFP) to identify and specify maintenance elements and tasks as to who, when and under what condition required actions are to be accomplished. Response to these RFP requirements should be in a form of validation and verification, through computer simulation, to further substantiate credence of previous feasibility studies and the contractors proposals to the RFP. The critical, repairable and high value items of spares, ground support equipment and training devices must be included in this effort, with computer simulation programing projected through at least 10 years of operational need for cost and logistical estimation purposes, and preferably for the planned life expectancy of the weapon system.

Supply Function

Let us now identify another significant logistic function critical to ultimate weapon system readiness, supply. Simply put, supply is providing hardware, software and services in a usable condition upon demand! However, there is a long and tortuous route from head source to the happy event just defined. It starts in the concept formulation phase with the maintenance concept where a determination must be made: Can this weapon system be maintained in a conventional manner, like the cargo aircraft referred to earlier, or is further development action required? Development action concurrent with the end item must correct this maintenance support deficiency. Progression into the contract definition phase provides the baseline for specific identification of what maintenance tasks will be done, where, and by whom. The overall reliability of the weapon system, its subsystems and components must then be addressed to that requirement. Maintainability to those reliability requirements must consider and provide for the tools, ground support and test equipment, spare components, repair parts, facilities, transportation, preservation, packaging, storage, issue, etc.

The supply concept and, subsequently, the more detailed supply support plan must be documented in the early part of the weapon system life cycle. Immediately upon contract award, the item commodity managers execute the supply support plan, and commence provisioning actions that will directly result in hardware procurement for initial and follow-on support purposes. These actions include identification and then selection of all potential spare components and repair parts, their classification as to high value, critical, repairable, etc., the quantity per line item for initial full-range coverage, and then determination of the need date and approximate costs associated with the approved lists.

While item/commodity managers are obligated to do this on every weapon system using their item, they are also responsible for considering current stocks on hand and correlating reprocurement actions for each new weapon system requirement with their world-wide inventory needs, plus using the production spares and installation component residue. The supply provisioning action is vital to the ultimate maintenance capability in support of the combat ready status of the weapon system. Not only is this true in or during its initial activation, but also in sustaining that combat ready status through depth of extended support.

Intimately related to supply is the function of reprocurement. The initial range of spares are provisioned to support the operational systems for one to two years. The reprocurement actions, necessary to sustain levels of stocks projected to support system readiness, will routinely fall upon the item/commodity managers of the Services or other DOD support agencies.

Initial identification and purchase of reprocurement data is a must, if lead times to reprocure are to be held to a minimum, and inventories are to enjoy configuration stability. Further, advantages of competitive contract reprocurement cannot be fully exploited without such data. Commonly, the development agencies of the Mil-

sponsible for weapon system and initial provisioning procurement. Subsequently, however, reprocurement of support items are the item/commodity managers' responsibility. The time period in which they pick up that responsibility varies within the Departments. While planning for the reprocurement activity should be considered early in the weapon system life cycle, normally the action does not physically take place until well into the acquisition phase. Predominantly, reprocurement actions are taken subsequent to testing and after the beginning of the operational phase. Long lead time items are exceptions to this policy. Initial test support table lists are purified and, hopefully, testing progression has begun to stabilize configuration and qualify subsystems and components.

Personnel Considerations

Another important link in the logistic chain is the personnel requirements. From the logistical point of view it must include the human, machine, environment relationships in determining total requirements. All too often, the training devices necessary to prepare the operators and maintenance personnel for military weapon systems have not been timely, have not been configured like the ultimate end item, and have not done the job of training those initial crews prior to tactical performance.

With the advent of modern technology, weapon systems have become highly complex. Determination must be made concerning what basic educational qualifications are necessary, the skill level requirement to perform various levels of maintenance support tasks, the quantities of those skills and personnel needed, curriculum courses to achieve that knowledge level, and the training devices necessary to transfer and demonstrate that performance level knowledge. The lead times involved in review and analysis to achieve that capability have many dependent variables fraught with delay hazards. Objective milestoning, with unrelenting management attention for progress, is the only method of achieving an adequate training posture by the weapon system need date, which is normally 90 to 120 days prior to tactical activation date.

Transportation Facilities

Transportation and facility requirements are two functional categories of logistic ingredients vital to weapon system readiness and operational flexibility. Both of these weapon system support prerequisites involve long lead time budget planning, and are dependent upon the maintenance, supply and operational concepts.

These two functions have traditionally responded to the need so consistently that there is a tendency to "take for granted" their support, without deliberately defining and projecting qualitative and quantitative requirements in these functional areas. Premium transportation to and from a central repair site, or issue from a central storage site, might well be offset cost-wise by the reduction of high value components required for a disbursed inventory, while enjoying an improved availability effectiveness as well. Correspondingly, mobile support teams might satisfy an operational deployment mobility requirement, while simultaneously fulfilling a facility requirement as well. As an example, jet engine test cells were initially a semi-permanent facility as were aircraft weighing scales. Both are now highly portable and mobile. Early planning and definition of requirements will allow these two vital functions to act, rather than react to a weapon systems need.

Technical Data

Throughout the functions, elements and tasks involving logistics flows the life blood of a sustained support capability, technical data. This includes technical orders, drawings, aperture cards, microfilms, reliability and maintainability factors, deficiency reporting, and all other data required to operate and maintain the weapon system and its support equipment at a high operational readiness state. Fund estimating techniques are at best vague, in the early concept formulation feasibility study time period for this vital ingredient. However, during contract definition, qualitative and quantitative requirements can be defined and stated in the RPF. The requirements should identify specific type and format of data desired, as there are excessive costs involved in certain types of format, even though all are acceptable under DOD policy guidance, depending on the specific need.

Contractor Support

A final function, not to be forgotten, is contractor support. The concept formulation studies should identify to what extent contractor support is to be required. All Military Departments employ such support to at least a limited degree. Some weapon systems elect to use it extensively, and for an extended period of time down the operational life cycle until design stability and organic capabilities are achieved. Regardless of the planned use, such facts are identifiable early and should materialize as specific requirements upon which costs and work-breakout tasks can be associated for proposal response.

Applying the Plan

The logistic support plan is initially executed within approximately 10 to 45 days after contract signature. Provisioning actions get under way, and procurement of initial support and follow-on reprocurement support commitment obligations are formulated. Test support tables are exercised and progressively refined to purify follow-on reprocurement, as configuration of the weapon system stabilizes. Many factors, outside of the logistic sphere, influence attaining and sustaining that fully equipped, combat ready weapon system status envisioned by all.

Let us look at a couple of the more influential factors; first, changes. Formal change control discipline does not really come to bear until the production baseline configuration has

been established, and the requirements of ANA Bulletin 445 apply. Once this point has been reached in the acquisition cycle, logisticians must consider and commit their activities to each change considering the impact involved in funds, materiel, schedule, and their ability to support the influencing requirement generating the change. These changes can be far-reaching, *e.g.*, the plan for a strategic, high-altitude bomber, for tactical reasons, being changed to a low-level, all-weather strike capability; the straight deck aircraft carrier, whose capability to support combat operations was enhanced by addition of the canted deck; the artillery piece and its awesome capability improvement through adaptability to the use of atomic munitions.

In each case cited, the changes had something in common. Each was monumental in its impact on the logistics functions of maintenance, supply, personnel, transportation, facilities and technical data, as well as the elements and tasks subordinate to those functions. Extensive provisioning reviews were necessary. Personnel training, skills, numbers of personnel, human factors and training devices were involved. New tools, testing, and repair procedures required changed original needs, and probably rendered most of those original needs either obsolete or subject to retrofit modifications. It is difficult for one, who has an appreciation of the logistic tasks involved, to envision how timely and adequate support came to pass in the actual examples referenced. This is because logistics is not yet a science.

A second influential factor is materiel deficiency reporting which generates inservice modification changes. It generates data for analysis considering systems and components that are high maintenance manhour consumers, and those causing excessive weapon system down time, increased overhaul requirements with related spares consumption, mission aborts, etc. This type of a reporting system is employed by all of the Military Departments. It provides the media for improved reliability and overall product improvement needed in support of weapon systems, by reuse of the reliable subsystems and components in future weapon systems, where practical, and non-use or redesign of the unreliable items.

Logistics Support

From a logistic support view, herein lies a great potential yet untapped for improved and more effective support, at reduced costs across the board, in the logistic functions, elements and tasks. In-Service engineers, in coordination with design engineers, could, if properly motivated by upper echelons of management, achieve meaningful weapon system support improvements in initial design through analysis and application of this available data. Using a qualified item has its attendant savings in design costs, technical data, in-being repair capability, maintenance learning curve established, supply channels stabilized, training courses and personnel skill requirements determined, etc., not to mention a known proven reliability factor.

Concurrent with this effort is the need for in-Service engineering considerations during design for maintainability requirements concerning man-machine relationships, *e.g.*, composite grouping within a weapon system of munitions, hydraulic, electrical, pneumatic and other subsystem-related components, rather than space available placement. This would allow full, simultaneous maintenance personnel saturation for turn around or re-launch. Also of importance is the consideration for natural body movements and positions of the maintenance technicians during the act of accomplishing a maintenance task, *i.e.*, standing on the floor or deck rather than on a maintenance stand or reaching back into an inaccessible crevice. Use of standard tools rather than special tools is another important factor in reducing the quantity of inventory items required.

Thirdly, all of the Military Departments have a functional method of doing logistical business. Determination of respective requirements of those various logistic functions, their time-phasing requirements and shifting of charter responsibilities during weapon system life cycle progression is a highly intricate process. Currently, there is no one central staff agency within the project/program managers organization, which is responsible for correlating this massive, complex, costly and vital effort into a fused, time-on-target realization. This void in our management scheme to acquire weapon systems is directly opposed to the concept of management by exception, unless of course one wants to believe no problem exists in planning and acquiring logistic support of our weapon systems and related equipment. The diversified functions and fragmented organizations, charted to exercise control of logistics support to program/project management, has many built-in cracks into which delegated and redelegated logistic tasks can fall. The program/project management office needs a staff agency responsible to its director for all logistics requirements of his program/project. It would be responsible for blending the in-Service/development engineering design into the best performance/maintainability configuration trade-off, and for meshing all the logistic functions, elements and tasks into hardware, software and services on a pre-determined "need date" basis.

Significant byproduct benefits would be accrued by this management application:

- The principle of intensifying management where a significant monetary and effectiveness improvement potential exists for the effort and cost outlay to attain that improvement.
- A centralized control of logistic requirements and input to the total weapon system, rather than the fragmented, tunnelized achievement now being experienced.
- Professionalism would be released, the engineers for doing engineering and the logistician to apply his talents toward needs for which currently many design engineering hours are being consumed, trying to fulfill what is believed to be valid logistic requirements.
- Establish the baseline for initial functional inputs of all logistical agencies, serve as the cornerstone upon which to base the operational planning, and provide continuity subsequent to transitioning of the weapon system from program/project to functional type management.
- Provide the logistician with the stature, prestige and responsibility commensurate with his government,

military and commercial counterparts, a consideration which is long past overdue if cost, schedule and performance are to be the true objectives in program/project management.

Logistics, to be sure, will for a considerable time period remain an art rather than a science. However, further use of available management principles and disciplines could improve its effectiveness considerably, when they are applied against specifics such as the monetary, stature and responsibilities referenced previously. An all-out research effort is needed to identify additional logistic requirements reducible to factors that are computer digestible. Research efforts in the use of computers to serve logistics should be intensified; especially in cost estimation and early planning and requirements determination phase, because it is here the support costs might well decide which weapon system or which concept of support is acceptable within certain time and dollar constraints.

For years to come, much professional guessing will still be involved in estimating logistic requirements across the board. Some of these estimates will be good and some bad, with costs and schedules probably being the most nebulous. Regardless of what is done to improve the logistic posture, the job will get done in the future just as it has in the past, but the accomplishment story does not stop there. While we like to think we live in a mechanical computerized age of pushbutton capability, if we eliminate the human determination to get the job done regardless or in spite of conditions our electronic, automatic, scientific management bubbles would undoubtedly burst. That is not to say management planning, control and direction are not necessary but, hopefully, it is to identify to management at all levels that their decisions have far-reaching effects on the logistic envelope. They should demand exhaustive logistic inputs to all plans and deliberations, with detailed consideration of impacts to logistic and commitments as to acceptability of those impacts by a responsible designated logistician. If this is not done, the logistic requirement you don't foretell will surface downstream and cost like hell, in dollars, schedule and combat readiness of our weapon systems.

References

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Conference on Computer Simulation, University of California, Los Angeles. "Symposium on Simulation Models," "Methodology and Applications to the Behavioral Sciences," Southwestern Publishing Co., 1961.

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ABOUT PEOPLE

(Continued from page 19)

ier, Commandant of the Fourteenth Naval Dist., and Commander, Pearl Harbor Naval Base.

RAdm. Eli T. Reich has been assigned as Asst. Dep. Chief of Naval Operations (Logistics).

RAdm. Stephen Sherwood has assumed command of the Naval Supply Center, San Diego, Calif. relieving **RAdm. Leland P. Kimball.**

Dr. Donald Ross has been appointed as Associate Technical Dir. and Head of the Acoustics and Vibration Laboratory, Naval Ship Research and Development Center, Washington, D.C.

Harvey L. Cupp has been named Superintendent of the Aircraft, Weapons, and Ship Div., Engineering Dep. (Ship Installations), Naval Air Engineering Center, Philadelphia, Pa.

The following captain assignments have been announced by the Bureau of Personnel:

Capt. Robert R. Crutchfield, Asst. Chief of Naval Personnel (Plans and Programs); **Capt. Jerome J. Scheela**, (SC), Commanding Officer, Naval Supply Center, Pearl Harbor, Hawaii; **Capt. Howard F. Curren** (CEC), Commanding Officer, Chesapeake Div., Naval Facilities Engineering Command, Washington D.C.; **Capt. Oscar F. Dreyer**, Commanding Officer, Missile Engineering Station, Port Hueneme, Calif.; **Capt. William M. Gustafson**, (CEC), Commanding Officer, Gulf Div., Naval Facilities Engineering Command, New Orleans, La.; **Capt. W. A. Hopkins**, Commanding Officer, Naval Air Engineering Center, Philadelphia, Pa.; **Capt. George D. Howard**, Commanding Officer, Naval Ordnance Missile Test Facility, White Sands Missile Range, N.M.; **Capt. Charles R. Lee**, Dir. of Supply, Naval Weapons Center, China Lake, Calif.; **Capt. Roland Rieve** (SC), Dep. Commander (Planning & Policy), Naval Supply Systems Command; and **Capt. Edward M. Sanders**, Asst. Commander (Research and Development), Naval Facilities Engineer Command Headquarters, Washington, D.C.

DEPARTMENT OF THE AIR FORCE

Norman S. Paul, Under Secretary of the Air Force, has announced his resignation to become effective Sept. 30, 1967. The President has nominated **Townsend Hoopes**, Principal Dep. Asst. Secretary of Defense (International Security Affairs), to be Mr. Paul's successor.

Maj. Gen. Don Coupland, has been assigned as Assistant to the Comptroller of the Air Force. **Brig. Gen. George E. Brown** relieves Gen. Coupland as Auditor General, in the Office of the Air Force Comptroller.

Maj. Gen. Donald W. Graham, has been assigned as Dir., Maintenance Engineering, Air Force Logistics Command Headquarters, Wright-Patterson AFB, Ohio.

The following assignments have been made in the Air Force Systems Command:

Brig. Gen. Harold C. Teubner, Dep. Chief of Staff, (Comptroller), Hq, AFSC, Andrews AFB, Md.; **Dr. Alan M. Lovelace**, Dir., Air Force Materials Laboratory, Wright-Patterson AFB, Ohio; **Col. Geoffrey Cheadle**, Director of Information, Hq, AFSC; **Col. M. A. Cristadoro**, Dep. for Engineering, Aeronautical Systems Div., Wright-Patterson AFB, Ohio; **Col. Robert W. Dickerson**, Dep. for Communications, Electronic Systems Div., L. G. Hanscom Field, Mass.; **Col. Robert A. Duffy**, Dep. for Re-Entry Systems, Space and Missile Systems Organization, Los Angeles, Calif.; **Col. Roy E. Guy**, Dep. Dir., Policy and Concepts Planning, Hq, AFSC; **Col. Robert D. Hippert**, System Program Dir., Advanced Manned Strategic Aircraft, Aeronautical Systems Div.; **Col. T. A. Redfield**, Track Director, Holloman AFB, N.M.; and **Col. Lee R. Standifer**, Director, Technology and Subsystems, Foreign Technology Div., Wright-Patterson AFB Ohio.

BIBLIOGRAPHY

RESEARCH REPORTS

Authorized DOD contractors and grantees may obtain these documents without charge from:
Defense Documentation Center
Cameron Station
Alexandria, Va. 22314
Others may purchase these documents at the price indicated from:
Clearinghouse for Federal and Scientific Information
Department of Commerce
Springfield, Va. 22151

Micrography of Tubular-Type Battery Plates. Naval Research Lab., Washington, D.C., Oct. 1966, 29 p. Order No. AD-643 750. $3.

High Rate Batteries. Naval Research Lab., Washington, D.C., Sept. 1966, 22 p. Order No. AD-645 942. $3.

Evaluation of Rechargeable Lithium-Copper Chloride Organic Electrolyte Battery System. Mallory and Co., Burlington, Mass., for the Army, Sept. 1966, 80 p. Order No. AD-643 378. $3.

Optimum Electrode Cavities for Thermionic Energy Converters. Thermo Electron Engineering Corp., Waltham, Mass., for the Air Force, Aug. 1966, 89 p. Order No. AD-641 432. $3.

Gas Chromatographic Analysis of the Pyrolysis Products of Organic Materials. Rock Island Arsenal, Army Weapons Command, Rock Island, Ill., Oct. 1966, 19 p. Order No. AD-644 648. $3.

Notched Properties of High-Strength Alloys at Various Load Rates and Temperatures. Army Materials Research Agency, Watertown, Mass., July 1966, 25 p. Order No. AD-647 884. $3.

Preparation of Thin Foils for Electron Microscopy by a Rotating Polytetrafluoroethylene Holder. Navy Marine Engineering Lab., Annapolis, Md., Feb. 1967, 17 p. Order No. AD-647 133. $3.

The Present Status of Chemical Research in Atmosphere Purification and Control on Nuclear-powered Submarines. Naval Research Lab., Washington, D.C., Jan. 1967, 60 p. Order No. AD-648 505. $3.

Development of Equipment and Techniques for Complex Fatigue Loading. Aeroprojects, Inc., West Chester, Pa., for the Army, Dec. 1966, 76 p. Order No. AD-646 647. $3.

Ultrasonic Spectroscopy. Army Materials Research Agency, Watertown, Mass., Dec. 1966, 19 p. Order No. AD-647 918. $3.

A Report Guide to Ultrasonic Testing Literature, Vol. III. Army Materials Research Agency, Watertown, Mass., Dec. 1966, 85 p. Order No. AD-648 905. $3.

Method for Extension of Dielectric Constant and Loss Measurements of Liquids to 100MHz with a Fixed-Geometry Sample Holder. Harry Diamond Laboratories, Washington, D.C., for the Army, Nov. 1966, 30 p. Order No. AD-646 655. $3.

Determination of Carbon Black in High Gloss Enamels and Lacquers. Army Coating & Chemical Lab., Aberdeen Proving Ground, Md., Nov. 1966, 12 p. Order No. AD-646 381. $3.

Use of Thin-Layer Chromatography (TLC) for Identification of Aircraft Engine Oil Components. Naval Research Lab., Washington, D.C., Nov. 1966, 16 p. Order No. AD-646 699. $3.

Manual for the Use of the Universal Stage in Optical Crystallography. Naval Propellant Plant, Indian Head, Md., July 1966, 76 p. Order No. AD-801 791. $3.

Measurement of Gas Density by Electron Scattering. Arnold Engineering Development Center, Arnold Air Force Station, Tenn., Feb. 1967, 113 p. Order No. AD-646 590. $3.

Progress in Air Cushion Vehicles. David Taylor Model Basin, Washington, D.C., Oct. 1966, 60 p. Order No. AD-646 607. $3.

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Dry-Packed Beds for the Removal of Strong-Acid Gases from Recycled Atmospheres. Naval Research Lab., Washington, D.C., Aug. 1966, 13 p. Order No. AD-642 274. $3.

Ferrocene and Ferrocene Derivatives. Redstone Scientific Information Center, Redstone Arsenal, Huntsville, Ala., Sept. 1966, 425 p. Order No. AD-645 876. $3.

Eigtheenth Materials Review. Chemical Research and Development Labs., Edgewood Arsenal, Md., Dec. 1965, 76 p. Order No. AD-474 956. $3.

DEFENSE PROCUREMENT CIRCULARS

Distribution is made automatically by the U.S. Government Printing Office to subscribers of the Armed Service Procurement Regulation.

Defense Procurement Circular No. 54, June 26, 1967. (1) Establishment of CWAS Coordinating Group. (2) Material Inspection and Receiving Report Clause. (3) Procurement Management Reporting System, Section XXI, Parts 1 and 2. (4) Organizational Conflicts of Interest. (5) Foreign Purchases, Duty and Customs, (6) Accident Prevention Clause—ASPR 7-602.42(a). (7) Property Administration.

GOVERNMENT PRINTING OFFICE PUBLICATIONS

These publications may be purchased at the prices indicated from: U.S. Government Printing Office, Washington, D.C. 20402.

U. S. Government Organization Manual, 1967–1968. Described the creation and authority, organization, and functions of the agencies in the legislative, judicial, and executive branches. Catolog No. GS 4.109:967. $2.

The Need for Professionalism in Resource/Cost Analysis

Major General Wendell E. Carter, USAF

Early in 1961 the Secretary of Defense recognized the need to manage the vast defense effort in terms of main program entities, *i.e.*, "output," associating each "output" with all of the resource "inputs," regardless of Congressional appropriations used to fund these resources. Such an association of total resource requirements, with a given program under consideration, permits the performance of cost-effectiveness analysis (or cost-benefit or resource analysis) which, in turn, sharpens the judgment of and aids the decision maker. These considerations, among others, pointed to the need of bridging the established planning function, performed in terms of "output," with the budget function performed in terms of "inputs."

The application of resource analysis has been broadened to go far beyond the military. The President's memorandum to the Cabinet in August 1965 and the implementing Bureau of the Budget Bulletin 66–3 established, throughout the Executive Branch of the Government, a Planning-programming-budgeting system incorporating the most modern management techniques now used in Government and industry.

The application of resource analysis is not limited to government departments. Indeed most large industrial concerns and the rapidly expanding research community have applied such techniques for many years to choose among risks, effectiveness and costs. Senator Hugh Scott (R.-Pa.) introduced a bill in the 89th Congress, and re-introduced it in the 90th Congress, proposing that the President appoint a national commission "to study and recommend the manner in which modern systems analysis and management techniques may be utilized to resolve national and community problems in the non-defense section."

In most of the extensive discussions of systems analysis as a technique for laying out the facts for the decision maker, there has been generally an implicit assumption that the "cost" side of cost/effectiveness analysis is easily produced, and that the major problem is measuring effectiveness satisfactorily. I agree with the latter point, but believe it is time to emphasize equally the problems of good cost or resource analysis. Good resource analysis depends on three factors: good methods, good data and good people.

With the advent of the computer the importance of good methods and good data received considerable attention. To date, however, relatively little has been said about increasing the quality of the most important of the three resources, namely, people.

This article addresses itself to this question of improving the quality among these personnel and in the profession as a whole.

It would seem apparent that there is a fundamental requirement for professionalism in all areas supporting decisions with such significant implications as our national security. As application of systems analysis techniques is extended throughout activities of the Federal Government, to many state and local governments, and to the private sector of the economy, it becomes obvious that there is an urgent and increasing need for professionalism among all who are performing cost analysis/cost effectiveness analysis as elements of systems analysis.

There are many definitions of professionalism. I will state the one that best expresses the thought I wish to leave. By professionalism I mean "a calling which requires specialized knowledge and often long and intensive preparation, including instruction in skills and methods as well as the scientific, historical, or scholarly principles underlying such skills and methods; commits its members to continued study and to a kind of work which has for its prime purpose the rendering of a special service; and maintains, by force of organization or concerted opinion, high standards of achievements and of conduct."

Specialized Knowledge

There would probably be little dispute about the requirement of a very high order of specialized knowledge to prepare an estimate of resources required to build a Manned Orbiting Laboratory, or a supersonic transport in an international competitive environment, regardless of where on the government-industry team the analyst may be sitting.

That a long and intensive preparation is necessary for an individual to qualify to make such an evaluation and analysis is not so immediately apparent. Yet these qualities are characteristics of effective performance in this area.

Practitioners, who are acknowledged as experts by their compatriots, all assert that good resource/cost analysts are made not born. They learn largely by doing.

Continued Study

Nothing is more apparent than the need for continued study because we have an exploding requirement

both qualitative and quantitative, for skilled practitioners.

As to whether these practitioners render a special service, I think it is clear that, in the defense environment alone, the preparation of proper cost estimates and effective analysis of cost data, as a part of the total analysis, is of definite importance to the entire country. This is true if we consider that proper choice of major weapons, proper choice of contractors to develop and produce them, proper choice of force size and composition of forces, not to mention the billions of dollars involved each year, are fundamental to the security of the country.

One, then, must note the spreading of this analytical technique to all Federal governmental activities and to many state and local communities, and to such major problem areas as urbanization, transportation, education, and the Great Society objectives. It, then, seems clear that the function of providing adequate cost estimates and appropriate analysis of such data is going to be of greater and greater importance to everyone in the United States.

Standards of Achievement and Conduct

There is a tremendous growth in the requirement for skilled resource/cost analysis personnel in both the Government and industry. In spite of the obvious need for standards which identify the skills needed by a qualified person, there are no such standards within the Civil Service. Neither are there special job titles against which individuals can be recruited, particularly those from outside the Government.

Partly as a result of this, arguments ensue as to what qualities are required in prospective employees and what achievements represent those of good practitioners. There is no organization or concerted opinion to set standards of achievement or conduct.

The application of cost analysis to weapon system and force structure studies is young. This very youth would argue for an organization of professionals, with standards for acceptance, which would help achieve maturity and credence.

On the basis of foregoing, it would appear that rules are needed to establish who are the real experts in resource/cost analysis. Agreement is needed on basic techniques and approaches which are acceptable. A broad continuing exchange of data and information on good techniques on a professional basis is necessary. In the long-term interest of improving the profession, there is a requirement for a method of committing the members of the cost analysis community to continued study and recognition of real authority. There is a need for an organization to "let in the good guys and keep out the bad guys" and something equivalent to a "white hat" for the good guys—to maintain by force of organization or concerted opinion high standards of achievement and conduct.

The growth of systems analysis as an effective tool in decision making may have its Achilles' heel in the lack of professionalism among resource/cost analysis practitioners. In cost-effectiveness decisions, an informed knowledge of resources required may, in many analyses, be the issue on which the decision turns, be that in Government or industry, in national defense or international relations, or in problems facing the Great Society objectives.

Major General Wendell E. Carter, USAF, is the newly appointed Deputy Assistant Secretary of Defense (Information) in the Office of the Assistant Secretary of Defense (Comptroller). At the time this article was written, he was Deputy Chief of Staff (Comptroller) of the Air Force Systems Command. In his new position, General Carter is responsible for the collection, analysis and reporting of resource management information for the Secretary of Defense.

I urge those who are fascinated by the techniques of systems analysis to take more interest in the validity of cost information which feeds analytical processes. I urge those who practice the art of cost analysis to professionalize this art as fast as possible. If this is the wave of the future in decision making, it must assure that the best ingredients are available to contribute to the best decisions.

TACFIRE Definition Phase Contracts Awarded

Three industrial teams have been awarded definition phase contracts in the Army's Tactical Fire Direction System (TACFIRE) program.

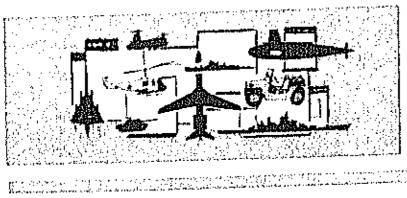
The three teams are headed by Burroughs Corp., Paoli, Pa.; Litton Industries, Van Nuys, Calif.; and IBM Corp., Gaithersburg, Md. The five-month study contracts are valued at $1 million to $1.5 million each.

TACFIRE is the lead system of the Army's overall tactical program to exploit the new technologies of data processing and subminiature electronics. This program, called Automatic Data Systems within the Field (ADSAF), is directed by General Roger M. Lilly, Commander of the Automatic Data Field Systems Command, Fort Belvoir, Va.

TACFIRE is a digital computer-based system which will be designed to enhance the supporting fires of the field artillery by full or partial automation of certain data-handling functions heretofore processed manually. Significantly increased response time and accuracy are design requirements.

TACFIRE is the first of three ADSAF systems to be developed, and its general purpose hardware will be the basis for equipping other tactical data systems.

The Army Electronics Command, Fort Monmouth, N.J., is furnishing procurement and technical support to the TACFIRE Project Manager.



DEFENSE PROCUREMENT

Contracts of $1,000,000 and over awarded during the month of July 1967.

DEFENSE SUPPLY AGENCY

3—The Defense Personnel Support Center, Philadelphia, Pa., has awarded the following contracts for combat boots:
 Endicott Johnson Corp., Endicott, N.Y. $2,032,126. 268,800 pairs.
 H. H. Brown Shoe Co., Worcester, Mass. $2,009,276. 262,732 pairs.
 Addison Shoe Corp., Wynne, Ark. $3,346,498. 450,000 pairs.
 Genesco, Inc., Nashville, Tenn. $1,795,199. 240,000 pairs.
 International Shoe Co., St. Louis, Mo. $1,538,000. 200,000 pairs.
 Sportwelt Shoe Co., Nashua, N.H. $5,745,853. 800,000 pairs.

—The Defense Personnel Support Center, Philadelphia, Pa., has awarded the following contracts for wind-resistant poplin cloth:
 Burlington Industries, Cramerton, N.C. $1,893,750. 2,500,000 linear yards.
 Prestex, Inc., New York, N.Y. $1,712,126. 2,225,000 linear yards.
 B. G. Colton & Co., New York, N.Y. $3,108,000. 4,000,000 linear yards.

—Hunter Outdoor Products, Long Island City, N.Y. $1,840,448. 253,132 mountain sleeping bags. Defense Personnel Support Center, Philadelphia, Pa.

5—Hyster Co., Portland, Ore. $1,876,392. 189 fork lift trucks. Defense General Supply Center, Richmond, Va.

—Outboard Marine Corp., Waukegan, Ill. $1,686,376. 1,200 centrifugal pumps. Defense Construction Supply Center, Columbus, Ohio.

6—The Defense Personnel Support Center, Philadelphia, Pa., has awarded the following contracts for men's polyester/wool coats:
 Franklin Clothes, Woodbine, N.J. $2,327,500. 100,000 coats.
 Marcie Dale, Inc., Atlantic City, N.J. $2,261,038. 112,770 coats.
 Merit Clothing Co., Mayfield, Ky. $3,242,200. 130,000.
 Albert Turner & Co., New York, N.Y. $1,262,800. 55,000 coats.

—West Point Pepperell, Inc., New York, N.Y. $1,400,750. 1,300,000 yards of cotton duck cloth. Defense Personnel Support Center, Philadelphia, Pa.

—International Textile Products, LaFollette, Tenn. $1,385,743. 14,612 tent liners. Defense Personnel Support Center, Philadelphia, Pa.

—Valley Metallurgical Processing Co., Essex, Conn. $1,346,354. 4,131,000 lbs. of aluminum powder. Defense General Supply Center, Richmond, Va.

—Aluminum Co. of America, Pittsburgh, Pa. $3,272,062. 10,011,400 lbs. of aluminum powder. Defense General Supply Center, Richmond, Va.

12—W & S Garment Mfg. Co., Chicago, Ill. $2,268,625. 861,920 cotton mattress covers. Defense Personnel Support Center, Philadelphia, Pa.

13—J. P. Stevens & Co., New York, N.Y. $1,808,859. 599,000 linear yards of tropical wool cloth. Defense Personnel Support Center, Philadelphia, Pa.

17—Camel Mfg. Co., Knoxville, Tenn. $1,258,839. 5,719 kitchen tents. Defense Personnel Support Center, Philadelphia, Pa.

CONTRACT LEGEND

Contract information is listed in the following sequence: Date—Company—Value—Material or Work to be Performed—Location Work Performed (If different than company location)—Contracting Agency.

—Mobil Oil Corp., New York, N.Y. $1,019,000. 200,000 barrels of grade DF-A Arctic diesel fuel. Defense Fuel Supply Center, Alexandria, Va.

24—Phipps Product Corp., Boston, Mass. $1,414,542. Various quantities of petro-chemicals. Defense Fuel Supply Center, Alexandria, Va.

—Burlington Industries, New York, N.Y. $3,703,590. 957,000 linear yards of wool serge cloth. Defense Personnel Support Center, Philadelphia, Pa.

26—Firestone Tire & Rubber Co., Akron, Ohio. $3,099,444. 760,251 liners for steel helmets. Defense Personnel Support Center, Philadelphia, Pa.

28—S. I. Handling Systems, Inc., Easton, Pa. $2,410,850. A mechanized materials handling system for the Defense Depot, Memphis, Tenn. Defense Construction Supply Center. Columbus, Ohio.

—Lane Myers Co., Protection, Kan. $1,235,675. 153,500 coils of concertina barbed wire. Defense Construction Supply Center, Columbus, Ohio.

ARMY

3—Federal Cartridge Corp., Minneapolis, Minn. $25,753,440. Production of various small arms ammunition. New Brighton, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Harvey Aluminum Sales, Torrance, Calif. $7,628,915. Loading, assembling and packing medium caliber ammunition. Milan, Tenn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Savin Bros., Inc., Bloomfield, Conn. $3,733,162. Construction of Black Rock Dam and appurtenant structures. Near Watertown and Thomaston, Conn. Engineer Dist., Waltham, Mass.

—Capital Radio Engineering Institute, Washington, D.C. $1,500,000. Classified services. Electronics Command, Fort Monmouth, N.J.

6—Ryan Aeronautical Co., San Diego, Calif. $1,185,861. Engineering flight services for the MQM-34D target guided missile. McGregor Range, N.M.; San Diego; Okinawa; Taiwan and Panama. Army Missile Command, Huntsville, Ala.

7—Gibraltar Mfg. Co., Port Huron, Mich. $1,537,315. Sprocket tank drives for M48 and M60 tanks. Tank Automotive Command, Warren, Mich.

—Rulon Co., Aurora, Ill. $1,384,075. Plunger body assemblies and firing pins assemblies for M48 fuzes. Chicago, Ill. Ammunition Procurement & Supply Agency, Joliet, Ill.

10—Mansfield Tire & Rubber Co., Mansfield, Ohio. $1,072,362. Tires for ¼-ton trucks. Tank Automotive Command, Warren, Mich.

11—International Telephone & Telegraph Corp., Nutley, N.J. $13,570,353. $1,000,221. Radio sets and tactical antenna systems. Clifton, N.J. Electronics Command, Philadelphia, Pa.

—H. L. Coble Construction Co., Montgomery, Ala. $4,612,896. Construction of 300 family housing units at Fort Benning, Ga. Engineer Dist., Savannah, Ga.

12—Go Corp., Adrian, Mich. $1,077,785. Track assemblies for M113 armored personnel carriers. Tank Automotive Command, Warren, Mich.

—Security Construction Co., Richmond, Va. $5,248,000. Construction of 340 family housing units at Fort Meade, Md. Engineer Dist., Baltimore, Md.

13—C. D. Murray Co., Syracuse, N.Y. $1,553,850. Construction work on the Cayuga Inlet Local Flood Protection Project, Ithaca, N.Y. Engineer Dist., Buffalo, N.Y.

—Hansel Phelps Construction Co. and Penner Construction, Greeley, Colo. $2,049,000. Construction of a dining hall at the Air Force Academy, Colorado Springs, Colo. Engineer Dist., Omaha, Neb.

—McDonnell Co., St. Louis, Mo. $2,500,000. Engineering development and test of an anti-personnel companion round for the Dragon weapon system. Titusville, Fla. Army Missile Command, Huntsville, Ala.

14—Blount Bros., Montgomery, Ala. $26,443,000. Work on the Hannibal Lock and Dam Project. Hannibal, Ohio and New Martinsville, W. Va. Engineer Dist., Pittsburgh, Pa.

—C. W. C. Associates, Uniondale, N.Y. $8,472,604. Rehabilitation of the Combat Specialities Training Personnel Center, Fort Dix, N.J. Engineer Dist., New York, N.Y.

—Prestolite Co., Toledo, Ohio. $1,202,132. 12-volt storage batteries. Oklahoma City, Okla., Vincennes, Ind., and East Point, Ga. Tank Automotive Command, Warren, Mich.

17—Atlas Chemical Co., Wilmington, Del. $1,084,852. TNT. Chattanooga, Tenn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Bell Helicopter Co., Fort Worth, Tex. $31,410,889. UH-1 helicopter rotary wing blades. Aviation Materiel Command, St. Louis, Mo.

18—Bizzack Bros., and Juett Construction Co., Frankfort, Ky. $1,733,956. Relocation of 4.8 miles of Kentucky Highway Number 76 including the construction of a 274-foot bridge for the Green River Reservoir. Near Campbellsville, Ky. Engineer Dist., Louisville, Ky.

—Newport News Shipbuilding & Drydock Co., Newport News, Va. $2,084,230. Design, manufacture and delivery of four hydraulic turbines for the Jones Bluff and Dam, Ala. Newport News, Va. and Benton, Ala. Engineer Dist., Mobile, Ala.

20—Goodyear Tire & Rubber Co., Akron, Ohio. $4,161,065. Pneumatic tires. Gadsden, Ala. Tank Automotive Command, Warren, Mich.

—R. E. Dailey & Co., Detroit, Mich. $2,648,028. Construction of outlet works and appurtenances at Paint Creek Reservoir, Ohio. Engineer Dist., Huntington, W. Va.

21—R. G. LeTourneau, Inc., Longview, Tex. $4,807,000. Metal parts for 750-lb. bombs. Ammunition Procurement & Supply Agency, Joliet, Ill.

—American Machine & Foundry Co., Brooklyn, N.Y. $4,845,086. Metal parts for 750-lb. bombs. Garden City, N.Y. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Bell & Howell Co., Chicago, Ill. $1,422,900. Time fuze metal parts for 60mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.

—General Motors, Cleveland, Ohio. $28,725,157. Armored reconnaissance/airborne assault vehicles. Army Weapons Command, Rock Island, Ill.

—Western Contracting Corp., Sioux City, Iowa. $2,204,450. Stage II construction of Kaysinger Bluff, Mo., Dam & Reservoir. Engineer Dist., Kansas City, Mo.

—United Aircraft, Stratford, Conn. $2,023,844. Detachable pods for the CH-54A Flying Crane. Aviation Materiel Command, St. Louis, Mo.

24—Hughes Tool Co., Culver City, Calif. $1,708,040. Rotary wing blades for light observation helicopters. Aviation Materiel Command, St. Louis, Mo.

—General Construction Co., Portland, Ore. $1,016,000. Work on the Columbia and Lower Willamette Rivers Project. Engineer Dist., Portland, Ore.

25—Harwell Construction Co., Orange, Va. $1,134,285. Construction work on the Buckhannon Flood Protection Project. Buckhannon, W. Va. Engineer Dist., Pittsburgh, Pa.

—L. H. Terry Construction Co., Louisville, Ky. $1,056,008. Work on the Brookville Reservoir Project, Brookville, Ind. Engineer Dist., Louisville, Ky.

—Page Airways, Rochester, N.Y. $1,136,229. Services and materials, for a one year period, for the maintenance of military aircraft and supporting equipment of the Army Aviation Detachment at the Naval Air Station, Lakehurst, N.J. Aviation Materiel Command, St. Louis, Mo.

26—Bulova Watch Co., Jackson Heights, N.Y. $1,359,721. Fuzes for 2.75-inch rockets. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Great Lakes Dredge & Dock Co., Cleveland, Ohio. $1,186,000. Work on the Buffalo, N.Y., Harbor Project. Engineer Dist., Buffalo, N.Y.

—Frix & Foster Construction Co., Muskogee, Okla. $1,221,318. Work on the Robert S. Kerr Lock & Dam Project. Near Keota, Okla. Engineer Dist., Tulsa, Okla.

—Remington Arms Co., Bridgeport, Conn. $2,468,960. 7.62mm cartridge tracers. $1,019,096. 5.56mm ball cartridges in 10-round clips. Frankford Arsenal, Philadelphia, Pa.

—Olin Mathieson Chemical Corp., East Alton, Ill. $2,135,900. 7.62mm cartridge tracers. Frankford Arsenal, Philadelphia, Pa.

—Olin Mathieson Chemical Corp., New Haven, Conn. $3,405,132. 7.62mm clipped cartridges. Frankford Arsenal, Philadelphia, Pa.

27—Johnson Bros. Highway & Heavy Constructors and D. H. Blattner & Sons, Litchfield, Minn. $1,034,792. Excavation of a cut-off trench at Chatfield Dam and Reservoir, near Denver, Colo. Engineer Dist., Omaha, Neb.

—Raytheon Co., Andover, Mass. $1,220,000. Rebuild stabilized magnetron assemblies for the Hawk missile system. Army Missile Command, Huntsville, Ala.

28—Baifield Industries, Carrollton, Tex. $2,681,280. 155mm cartridges cases. Shreveport, La. Ammunition Procuement & Supply Agency, Joliet, Ill.

—Kaiser Jeep Corp., Toledo, Ohio. $23,134,616. 1¼-ton vehicles. General Purpose Vehicles Project Manager, Warren, Mich.

—General Electric, Syracuse, N.Y. $2,030,000. Radar sets. Pittsfield, Mass., and Syracuse. Electronics Command, Fort Monmouth, N.J.

—Gregg, Gibson & Gregg, Leesburg, Fla. $1,799,322. Construction work at the Central and Southern Florida Flood Control Project. Orlando and Cocoa Beach, Fla. Engineer Dist., Jacksonville, Fla.

—R. R. Dawson Bridge Co., Bloomfield, Ky. $1,240,612. Green River Reservoir Project. Campbellsville, Ky. Engineer Dist., Louisville, Ky.

31—Honeywell, Inc., Tampa, Fla. $7,645,261. Multiplexer components for use in the Army Area Microwave Relay Communications System. Electronics Command, Fort Monmouth, N.J.

—Frequency Engineering Laboratories, Farmingdale, N.J. $2,841,900. Compact light relay sets for ground troops. Electronics Command, Philadelphia, Pa.

—Polarad Electronics Corp., Long Island City, N.Y. $1,743,000. Signal generators. Electronics Command, Philadelphia, Pa.

—Caterpiller Tractor Co., Peoria, Ill. $10,180,730. Diesel engine driven tractors. Mobility Equipment Command, Warren, Mich.

—Machlett Laboratories, Inc., Stanford, Conn. $8,975,477. 25mm image intensifier assemblies. Electronics Command, Fort Monmouth, N.J.

—A. O. Smith Corp., Chicago, Ill. $6,843,406. Metal parts for 750-lb. bombs. Waco, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Hanson Machinery Co., Tiffin, Ohio. $6,177,911. Five-ton cranes. Mobility Equipment Command, St. Louis, Mo.

—Machlett Laboratories, Stamford, Conn. $5,170,000. Miniscopes for the Night Vision Program. Electronics Command, Fort Monmouth, N.J.

—Koehring Co., Newton, Iowa. $3,673,357. Ditching machines. Mobility Equipment Command, Warren, Mich.

—Elliott Machine Works, Phoenix, Ariz. $2,123,199. Trailer mounted lubricating and servicing units. Galion, Ohio and Phoenix. Mobility Equipment Command, Warren, Mich.

—Southwest Truck Body Co., St. Louis, Mo. $2,104,321. Six-ton semi-trailers. West Plains, Mo. Tank Automotive Command, Warren, Mich.

—AVCO Corp., Stratford, Conn. $1,823,999. First stage nozzles for T53 turbine engines. Aviation Materiel Command, St. Louis, Mo.

—Firestone Tire & Rubber Co., Akron, Ohio. Pneumatic tires for earth movers. Des Moines, Iowa. Tank Automotive Command, Warren, Mich.

—Craftsman Construction Co., Denver, Colo. $1,196,750. Construction of a supply and procurement training building at Lowry AFB, Calif. Engineer Dist., Omaha, Neb.

NAVY

3—McDonnell-Douglas Corp., St. Louis, Mo. $123,349,800. Configuration changes in the F-4E aircraft. Naval Air Systems Command.

—Lockheed Aircraft, Burbank, Calif. $55,027,050. P3B aircraft. Naval Air Systems Command.

—Sanders Associates, Nashua, N.H. $7,539,480. Electronic equipment. Naval Air Systems Command.

—Litton Systems, Woodland Hills, Calif. $4,201,947. Inertial navigation systems. Naval Air Systems Command.

—General Motors, Indianapolis, Ind. $1,842,272. Modification of a complete gas generator test rig for theoretical maximum turbine inlet temperature. Naval Air Systems Command.

—International Harvestor Co., Melrose Park, Ill. $1,436,065. Aircraft towing tractors. Naval Air Systems Command.

—Raytheon Co., Lexington, Mass. $1,375,000. Sparrow III guided missiles. Lowell, Mass. Naval Air Systems Command.

—Sanders Associates, Nashua, N.H. $1,078,647. Work on a classified electronics program. Naval Air Systems Command.

—Sanders Associates, Nashua, N.H. $1,026,173. Investigation, test and evaluation of current and future destruct techniques and devices and related problems. Naval Air Systems Command.

—National Steel & Shipbuilding Co., San Diego, Calif. $24,838,900. One combat store ship (AFS). Naval Ship Systems Command.

—Teledyne, Inc., Burlington, N.J. $11,177,893. Radio transceivers, control units, reports and data. Naval Ship Systems Command.

—I.B.M., Owego, N.Y. $6,033,861. Sonar equipment. Naval Ship Systems Command.

—Straza Industries, El Cajon, Calif. $1,879,560. Submarine mine detection sonar sets. Naval Ship Systems Command.

—Sperry Piedmont Co., Charlottesville, Va. $1,920,797. Radar sets. Naval Ship Systems Command.

—Hughes Aircraft, Fullerton, Calif. $1,209,300. Beacon video processors, associated hardware and software for use with naval tactical data systems on ships. Naval Ship Systems Command.

—Columbus Milpar & Mfg. Co., Columbus, Ohio. $6,474,780. Fin assemblies for the Mark 82, 500-lb. bomb. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—American Mfg. Co. of Tex., Fort Worth, Tex. $3,864,000. Mark 82, 500-lb. empty bomb bodies. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—Intercontinental Mfg. Co., Garland, Tex. $1,091,141. Mark 82, 500-lb. empty bomb bodies. Navy Ships Parts Control Center, Mechanics, Pa.

—Barrus Construction Co., Kingston, N.C. $1,161,400. Construction of an aircraft parking apron at the Marine Corps Air Facility, Jacksonville, N.C. Atlantic Div., Naval Facilities Engineering Command, Norfolk, Va.

—Dynelectron Corp., Washington, D.C. $1,099,288. Data processing and related work. Point Mugu, Calif. Navy Purchasing Office, Los Angeles, Calif.

—Unitec Industries, Timonium, Md. $5,669,095. A mobile electric power plant for servicing aircraft. Washington, D.C. Navy Purchasing Office, Washington, D.C.

—Bendix Corp., Mishawaka, Ind. $3,173,000. Continued engineering and development in the conversion of the Talos Missile Telemetry System. Naval Ordnance Systems Command.

5—Westinghouse Electric, Baltimore, Md. $19,063,578. Airborne radar sets. Naval Air Systems Command.

—Collins Radio Co., Cedar Rapids, Iowa. $6,667,185. Airborne communication, navigation, and identification systems. Naval Air Systems Command.

—Bendix Corp., Baltimore, Md. $4,590,782. Airborne radio receiver transmitter sets and related equipment. Naval Air Systems Command.

—Westinghouse Electric, Baltimore, Md. $2,562,500. Radar sets for F-4D aircraft. Naval Air Systems Command.

—Sundstrand Corp., Rockford, Ill. $2,065,370. Constant speed drives and frequency control boxes. Naval Air Systems Command.

—Sanders Associates, Inc., Nashua, N.H. $1,364,000. Classified electronic equipment. Naval Air Systems Command.

—North American Aviation, Los Angeles, Calif. $1,126,592. Lease of three multi-engine light jet aircraft and supporting material and services. Naval Air Systems Command.

—Logicom, Inc., San Pedro, Calif. $3,560,923. Computer programming for the Fleet Computer Programing Center, San Diego, Calif. Navy Purchasing Office, Los Angeles, Calif.

—Lockheed Electronics Co., Watchung, N.J. $1,050,000. Design, development and engineering for service use, mandatory improvements for gun fire control system Mark 86 and related equipment. Metuchen, N.J. Naval Ordnance Systems Command.

—Lockheed Missiles & Space Co., Sunnyvale, Calif. $35,389,082. Tactical engineering services in support of the fleet ballistic missile weapon system. Special Projects Office.

—Washington Military Systems, Bethesda, Md. $3,549,832. Engineering and support services for fleet ballistic missile weapon system training installations. Special Projects Office.

—Interstate Electronics Corp., Anaheim, Calif. $6,250,000. Phase Two development of Poseidon (C-3) Digital Test Instrumentation Subsystem. Special Projects Office.

6—Collins Radio Co., Cedar Rapids, Iowa. $5,971,028. Communication, navigation, identification systems and related equipment. Naval Air Systems Command.

—LTV Aerospace Corp., Dallas, Tex. $5,000,000. Improvement changes to extend the service life of RF-8A aircraft. Naval Air Systems Command.

—McDonnell-Douglas, St. Louis, Mo. $5,359,586. Bomb racks and related equipment. Torrance, Calif. Naval Air Systems Command.

—Sparton Corp., Jackson, Mich. $2,885,873. Sonobuoys. Naval Air Systems Command.

—Sanders Associates, Nashua, N.H. $1,309,474. Evaluate, repair and modify electronic equipment. Naval Air Systems Command.

—General Precision, Little Falls, N.J. $1,161,750. Airborne navigation sets. Naval Air Systems Command.

—Litton Systems, Silver Spring, Md. $1,009,492. Electronic countermeasure equipment. College Park, Md. Naval Air Systems Command.

—General Dynamics, Pomona, Calif. $10,000,000. Production of Type I guidance control and ordnance sections for the Standard Missile. Naval Ordnance Systems Command.

—Goodyear Aerospace Corp., Akron, Ohio. $8,996,273. Production of Subroc missiles and related equipment. Naval Ordnance Systems Command.

—General Precision, Glendale, Calif. $6,000,000. Production of ordnance alteration kits for various fire control systems and for MK 48 torpedoes. Naval Ordnance Systems Command.

—General Precision, Glendale, Calif. $2,294,000. Production of various fire control systems. Naval Ordnance Systems Command.

—Clevite Corp., Cleveland, Ohio. $1,500,000. Research and development of the comb filter techniques now being developed for MK 48 torpedoes. Naval Ordnance Systems Command.

—Electronics Communications, Sarasota, Fla. $2,441,723. Radio equipment. Naval Ship Systems Command.

7—Hughes Aircraft, Culver City, Calif. $15,000,000. Incremental funding for the Phoenix missile system. Naval Air Systems Command.

—Lockheed Aircraft, Marietta, Ga. $6,847,500. Progressive maintenance on Navy aircraft. Naval Air Systems Command.

—Hayes International Corp., Birmingham, Ala. $1,308,147. Progressive maintenance on Navy aircraft. Naval Air Systems Command.

—Westinghouse Electric, Baltimore, Md. $1,800,000. Incremental research and development funding for prototype models of special exercise sections for MK 48 torpedoes. Naval Ordnance Systems Command.

—General Dynamics, Pomona, Calif. $1,000,000. Materials, labor, services and equipment to remove and replace original roofing and to install automatic roof vents on buildings at the Naval Industrial Re-

Materiel Area, (AFLC), Robins AFB, Ga.
—**Philco-Ford Corp.**, Philadelphia, Pa. $1,724,700. Production of communications equipment. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.
—**General Motors**, Indianapolis, Ind. $1,930,423. Production of T-56 engine components. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.
18—**Radiation, Inc.**, Melbourne, Fla. $3,791,595. Testing, engineering and production of an airborne/ground data relay system. Palm Bay, Fla. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass.
19—**TRW, Inc.**, Los Angeles, Calif. $2,074,500. Research, development, fabrication and manufacture of launch and orbital equipment for the VELA satellite program launch vehicle. Space & Missile Systems Organization, (AFSC), Los Angeles, Calif.
—**Sylvania Electric Products**, Needham Heights, Mass. $3,936,984. Support of a ground electronics system. Space & Missile Systems Organization, (AFSC), Los Angeles, Calif.
—**International Aerospace Services**, Charleston, S.C. $1,052,123. Inspection and repair of C-124 aircraft. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.
20—**Honeywell, Inc.**, Hopkins, Minn. $7,000,000. Production of land mines and associated equipment. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.
—**Perkin Elmer Corp.**, Norwalk, Conn. $2,000,000. Manufacture of laser reconnaissance sets. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.
—**Garrett Mfg. Ltd.**, Rexdale, Ontario, Canada. $1,208,768. Production of pressure temperature tests sets used in support of various aircraft. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.
21—**Boeing Co.**, Seattle, Wash. $2,160,048. Design, fabrication, assembly, checkout and testing of Minuteman equipment. Space and Missile Systems Organization, (AFSC), Los Angeles, Calif.
24—**Hughes Aircraft**, Los Angeles, Calif. $4,727,466. Manufacture of electronic spare parts. El Segundo, Calif. Warner Robins Air Materiel Area (AFLC), Robins AFB, Ga.
25—**Lockheed Aircraft**, Sunnyvale, Calif. $1,500,000. Work on a satellite control facility. Space and Missile Systems Organization, (AFSC), Los Angeles, Calif.
—**Honeywell, Inc.**, Hopkins, Minn. $4,370,731. Production equipment for aircraft ordnance production. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.
—**McDonnell-Douglas Corp.**, Tulsa, Okla. $1,187,400. Installation of modification kits in RB-66B aircraft. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.
26—**Burroughs Corp.**, Paoli, Pa. $1,440,400. Back-up Interceptor Control (BUIC) site activation and related services. Electronics Systems Div., (AFSC), L. G. Hanscom Field, Mass.
—**General Dynamics**, Fort Worth, Tex. $2,880,000. Manufacture of pylon assemblies for F-111 aircraft. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.
—**General Electric**, Evendale, Ohio. $4,323,996. Major facilities expansion in support of J-79 engine production. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.
—**McDonnell-Douglas Corp.**, St. Louis, Mo. $1,200,000. Re-entry vehicle feasibility flight test program. Space and Missile Systems Organization, (AFSC), Los Angeles, Calif.
—**Boeing Co.**, Seattle, Wash. $5,000,000. Installation of antenna systems. Rapid City, S.D. Space and Missile Systems Organization, (AFSC), Los Angeles, Calif.
27—**North American Aviation**, Anaheim, Calif. $18,666,441. Design and development of a post boost control system for the Minuteman missile. Space & Missile Systems Organization, (AFSC), Los Angeles, Calif.
—**Chicago Aerial Industries**, Barrington, Ill. $2,720,620. Production of camera systems and lens cones. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.
—**Curtiss-Wright Corp.**, Wood-Ridge, N.J. $1,271,149. Production of aircraft engine components. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.
—**International Telephone & Telegraph Services**, Paramus, N.J. $1,245,000. Management, maintenance and operation of Air Force Plant 42 in Palmdale, Calif. Air Force Flight Test Center, Edwards AFB, Calif.
28—**Systems Development Corp.**, Santa Monica, Calif. $14,389,265. Computer program updating and preparation of system training programs. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.
—**Electronic Communications, Inc.**, St. Peterburg, Fla. $3,363,133. Manufacture of electronic equipment for installation on EC-135 aircraft. Warner-Robins Air Materiel Area, (AFLC), Robins AFB, Ga.
—**AVCO Corp.**, Wilmington, Mass. $1,598,000. Work on a ballistic re-entry vehicle program. Space and Missile Systems Organization. (AFSC), Los Angeles, Calif.
—**Aerodex, Inc.**, Miami, Fla. $1,438,699. Overhaul of R-4360 reciprocating aircraft engines. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.
31—**Philco-Ford Corp.**, Palo Alto, Calif. $1,500,000. Work on a ground to space communications system. Space and Missile Systems Organization, (AFSC), Los Angeles, Calif.

OFF-SHORE PROCUREMENT

The following contracts were awarded by the U.S. Procurement Center, Frankfurt, Germany, on June 30:
—**Federal Republic of Germany, Bundesamt fuer Wehrtechnik und Beschaffung**, Koblenz, Germany. $8,390,658. 20mm guns and accessories. Dusseldorf, Germany.
—**Federal Republic of Germany, Bundesamt fuer Wehrtechnik und Beschaffung**, Koblenz, Germany. $15,453,052. 20mm ammunition. Dusseldorf, Germany.
—**Ford-Werke AG**, Koeln, Germany. $1,099,764. Vehicles and equipment. Kent, Ohio.
—**Jugoexport**, Belgrade, Yugoslavia. $1,588, 383. Household furniture.

Three Navy Research Centers Established

The U.S. Navy created three new research centers July 1 in a move to improve application of technology to naval warfare problems.

The new centers, formed from existing centers and laboratories in California, are:

- Naval Command Control Communications Laboratory Center (NCCCLC), San Diego, created from the Navy Electronics Laboratory (less its Underseas Technology Directorate).
- Naval Underseas Warfare Center (NUWC), Pasadena, made up of Pasadena Annex of the China Lake Naval Ordnance Test Station and several of its auxiliary sites, and the Underseas Technology Directorate of the Navy Electronics Laboratory.
- Naval Weapons Center (NWC), China Lake, established from the Naval Ordnance Test Station, China Lake, and the Naval Ordnance Laboratory, Corona. The Corona portion is called the Naval Weapons Center Corona Laboratories.

Commander of the NCCCLC is Captain William R. Boehm. The NUWC commander is Captain Grady H. Lowe, who is also acting commander of the NWC.

NSIA Symposium Looks to the Future

"National Research and Development for the 1970s" will be the theme for the third biennial symposium, sponsored by the Research and Development Advisory Committee of the National Security Industrial Association (NSIA). The conference, to be held in Washington, D.C., Oct. 18–19, will feature high-level speakers from the research and development community of the Government, industry and the academic world.

There will be four sessions in the two-day meeting covering the following subjects:

- The widening objectives of research and development in the 1970s.
- Technology forecasting and research and development planning.
- Institutions of the future.
- Methodology for national research and development programs.

The social aspects of the meeting will include two luncheons and a banquet. The evening function will feature a prominent speaker.

For registration and additional information, the contact is:

Paul A. Newman
National Security Industrial Association
1030 15th St., NW
Washington, D.C. 20005
Phone: (202) 296-2266

Project ARISTOTLE

(*Continued from page 6*)

so imperative for understanding in an undertaking such as this.

I suspect that few of us expected, at the onset, the interest and activity which ARISTOTLE would create. Moreover, I feel that outside of this effort other groups are recognizing the impact which DOD training and education is having on the economy. The entire May issue of *Phi Delta Kappa* was devoted to military education and training. Both industrialists and educators are requesting more and more information about the techniques being developed and utilized in our program, hoping that they might have use for them. The Defense Department is cooperating more closely than ever before with other Federal and local governmental agencies on projects such as Project TRANSITION. We are hoping that ARISTOTLE continues to foster these good working relationships.

OFFICE OF THE SECRETARY OF DEFENSE
WASHINGTON, D. C. 20301

OFFICIAL BUSINESS

POSTAGE AND FEES PAID

Evaluation of Proposals Completed for Navy's Fast Deployment Logistic Ships

Defense Department and Navy officials have completed evaluation of design and construction proposals for the Navy's Fast Deployment Logistics (FDL) Ships program which were submitted by three companies in January 1967. Litton Systems, Inc., Culver City, Calif., submitted the best technical proposal, considering all relevant factors including efficiency of ship and life cycle cost. Other companies submitting proposals were General Dynamics Corp., Quincy, Mass., and Lockheed Shipbuilding and Construction Co., Seattle, Wash.

The Congress disapproved the authorization in this year's budget request to move ahead with the program and proceed with construction. If on resubmission the program is approved by the Congress next year, the Navy would award a contract after further negotiation with Litton Systems. The contract would be awarded either to Litton Systems or, if negotiations with that company were unsatisfactory, to the successful bidder in an open competition. The bidding opportunity would be industry-wide and would include the three original contractors with the design plans to be based on the Litton Systems proposal.

The selected design contemplates large, fast, non-combatant ships with an endurance of over 8,000 miles, a displacement of about 40,000 tons, and a speed of over 24 knots. Their length (848 feet) and beam (104 feet) will permit them to transit the Panama Canal, and they will be able to use most of the world's major ports. With amphibians and large cargo helicopters, they will be able to offload efficiently and rapidly their 10,000 tons of military cargo, including wheeled and tracked vehicles, without dependence on port or existing handling facilities.

DOD has emphasized its belief that the FDL ships can most efficiently and economically satisfy the continued requirement for specialized military sealift for rapid deployment and rapid reinforcement of Army forces.

DESC and AFSC Study Standardization of Electronic Parts

The Defense Electronics Supply Center (DESC), Dayton, Ohio, and the Air Force Systems Command have developed a joint study project that will permit DESC engineers to serve as standardization advisers during the development of four major Air Force weapon systems.

The project's objective is to establish a more economical and reliable electronic parts inventory. Primarily, it will curb the proliferation of new items by standardizing parts at the development level and weed out duplicates before they enter the supply system.

DESC engineers will be entitled to attend Parts Control Board meetings involving F-111 MARK II and C-5A aircraft, the SRAM missile and the 407L system. Each firm will report on items proposed for its respective assembly. This will enable all sub-contractors to immediately pinpoint areas where standardization might be introduced.

The center engineers will help identify common parts and counsel sub-contractors on format and technical problems related to the preparation of part specifications.

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DEFENSE INDUSTRY BULLETIN

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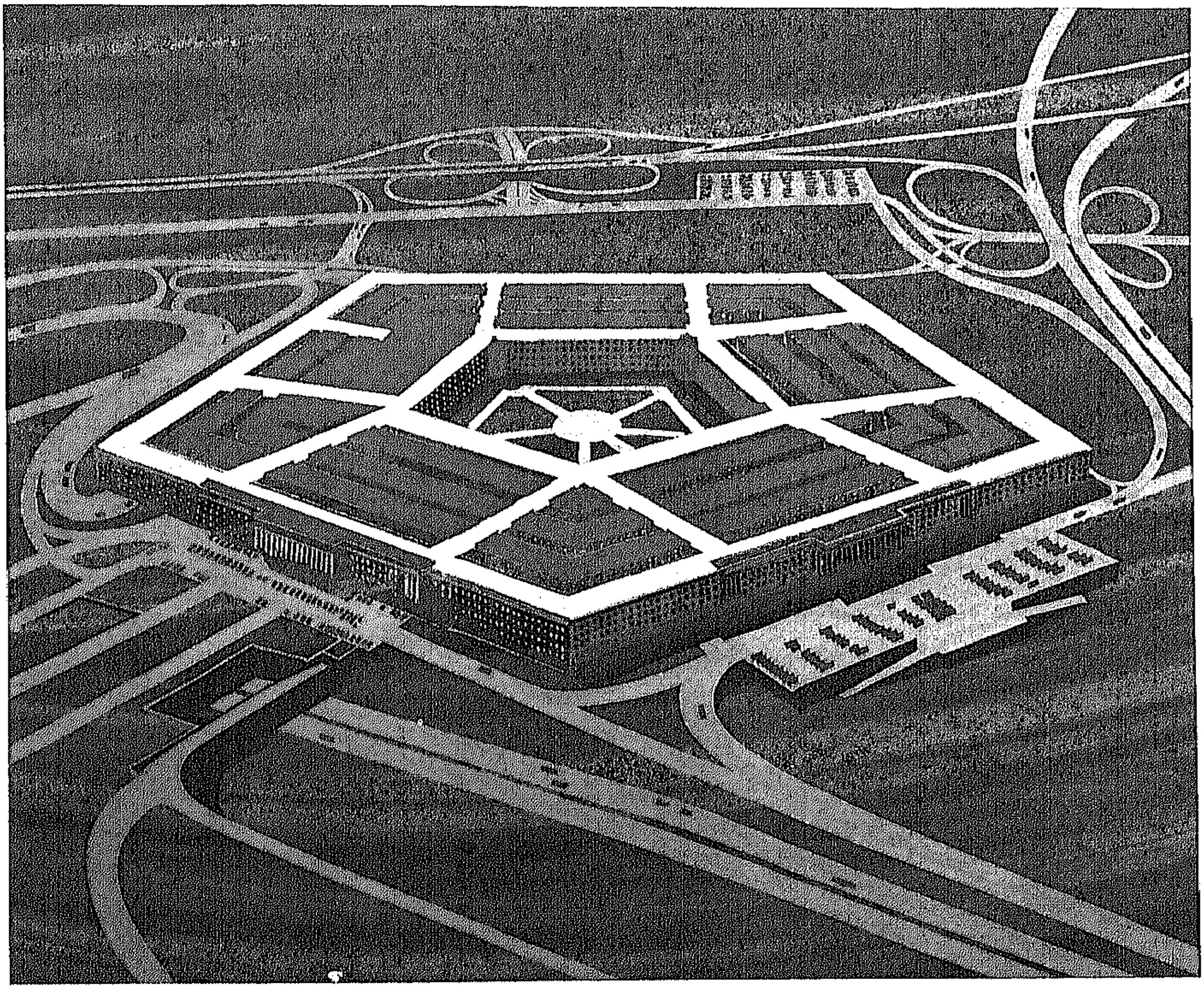

THE PENTAGON

IN THIS ISSUE

FEATURES

DEPARTMENTS

The *Defense Industry Bulletin* is published monthly by the Business & Labor Division, Directorate for Community Relations, Office of the Assistant Secretary of Defense (Public Affairs). Use of funds for printing this publication was approved by the Director of the Bureau of the Budget.

The purpose of the *Bulletin* is to serve as a means of communication between the Department of Defense (DOD) and its authorized agencies and defense contractors and other business interests. It will serve as a guide to industry concerning official policies, programs and projects, and will seek to stimulate thought by members of the defense-industry team in solving the problems that may arise in fulfilling the requirements of the DOD.

Material in the *Bulletin* is selected to supply pertinent unclassified data of interest to the business community. Suggestions from industry representatives for topics to be covered in future issues should be forwarded to the Business & Labor Division.

The *Bulletin* is distributed without charge each month to representatives of industry and to agencies of the Department of Defense, Army, Navy and Air Force. Requests for copies should be addressed to the Business & Labor Division, OASD(PA), Room 1E764, The Pentagon, Washington, D.C. 20301, telephone, (202) OXford 5-2709.

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DEFENSE INDUSTRY BULLETIN

Published by the Department of Defense

pt Formulation and Contract Definition

Robert G. Alexander

tion is the first of contract definition (Figure 1). It is tablishing the con lishing the prere ering and opera elopment.

lation is not a er, it describes the g: contract defini ies include the ex engineering, and conducted under advanced develop ide the technical, tary bases for the a item or system. on includes those ectly lead to, or it ends with action mittee establishing oject.

tes of Concept lation

sists that the pre pt formulation, as Directive 3200.9, and is presented, it a basis for the key cretary of Defense l approval to enter tally, as one prog- se prerequisites, it at the Army Mate C) cannot accomp- ate that the Com- Command, the Command, and the Army Staff will be participants. quisite is that of t, the mission and pes have been defined. The mission objectives must be specifically described, the operational concept and the logistic concepts defined, and the item or system performance requirements specified to include reliability and maintainability. This prerequisite is intended to demonstrate that the system will meet a valid mission or current operational objective.

It then must be demonstrated that the best technical approaches have been selected, based on a parametric analysis of possible alternatives. For example, if an armored reconnaissance scout vehicle for jungle warfare is required, the best technical approaches might be a tracked vehicle, a wheeled vehicle, or a ground effects machine. In selecting one of these vehicles, its technical superiority must be demonstrated.

Robert G. Alexander is Chief of the Program Support Branch in the Development Directorate, U.S. Army Materiel Command, Washington, D.C. He has been in government service since 1946 and, before coming to AMC headquarters in 1964, he held assignments in the research and development field at the U.S. Army Mobility Command and the U.S. Army Engineer Research and Development Laboratories, Fort Belvoir, Va.

A third prerequisite is to demonstrate that primary engineering rather than experimental effort is required, and that the technology needed is sufficiently in hand. This is a point of major importance. Fundamentally, the degree of advancement depends on the level of confidence in the probability of successful development which must be supported by, at least, a laboratory demonstration.

The fourth prerequisite assures that a thorough trade-off analysis has been made. The primary goal of this analysis is to achieve an optimum balance among operational effectiveness, schedule and cost, based on differing alternatives within the system.

A favorable cost effectiveness must be determined for the proposed item in relation to the cost effectiveness of competing items on a DOD-wide basis. This effort analyzes the total cost of the system, including development, production, and operation and maintenance costs. The item is compared with systems in other Military Departments to prevent unwarranted expenditures and "re-invention of the wheel."

Finally, it must be demonstrated that cost and schedule estimates are credible and acceptable. These estimates are for the total life cycle of the system.

Although it is a major task to demonstrate that these prerequisites have been met for a proposed development project, it should be emphasized that the decision to give conditional approval for development also implies that it will be produced and deployed. The Army Materiel Command requires that concept formulation be completed for all projects, with the approval of the concept formulation package stratified at different levels depending on the total dollar investment involved. The commanders of AMC major subordinate commands are authorized to approve the concept formulation for projects with dollar investment below $50 million. Others are submitted to Headquarters, AMC, or to the Department of the Army.

Conditional Approval To Proceed

Let us now examine how the conditional approval to proceed with development occurs. First, for all major projects, a Program Change Request (PCR) and an early Technical Development Plan (TDP) are submitted, through the Department of the Army, to the Office of the Secretary of Defense. The project is then introduced into the Five Year Defense Program. An engineering development request follows with an up-to-date Technical Development Plan, a plan for contract definition, and a report on the status of meeting the six prerequisites just discussed.

With completion of these steps, the request to enter contract definition is signed by the Secretary of Defense, indicating that engineering development is conditionally approved.

Contract Definition

Contract definition is the second period in the definition planning process (Figure 1), but the first step in engineering development. It is a formal step during which preliminary design and engineering are verified or accomplished, and firm contract and management planning are performed. Normally accomplished by two or more competing contractors, the primary result of contract definition is a key decision—approval before full-scale development can be initiated.

Full-scale development is devoted to the engineering and testing of an end item or system actually intended for service use, and follows contract definition whenever that step is required. DOD Directive 3200.9 specifies that contract definition will be required for those major projects with estimated research, development, test and evaluation (RDT&E) funding above $25 million or a production investment of $100 million. DOD or Department of the Army may designate other projects for this detailed planning process.

Contract definition is directed toward these goals: the ratification of approval for full scale development and the definition of the development contract (Figure 2). It is conducted in three phases:

- Phase A. The proposals for the conduct of contract definition are solicited, received and evaluated, and two or more competing contractors are selected.
- Phase B. The contract definition tasks are accomplished by competing contractors.
- Phase C. Contractor proposals for full-scale development are evaluated, the development contractor is selected, and the contract is negotiated.

These phases will be discussed in more detail later.

Contract definition ends with the ratification of the conditional approval for development.

Development and Production

Terminology of the remaining activities are development and production. These activities are very much affected by decisions made during the definition planning process. The contract negotiated following contract definition was traditionally for development only. In some cases within DOD, the production decision has been made concurrently with the ratification of the development decision at the end of contract definition. In the case of the Air Force C-5A troop and cargo aircraft, the development contract also included initial production quantities and logistic support of the aircraft. The Army has yet to use this "Total Package Procurement" on any projects above the DOD threshold (RDT&E $25 million or $100 million production investment). A quasi-total-package-procurement approach has been used on the Advanced Aerial Fire Support System which includes a production option.

Why Concept Formulation and Contract Definition?

Among the results expected from concept formulation and contract definition are significant savings in total operational system costs. The

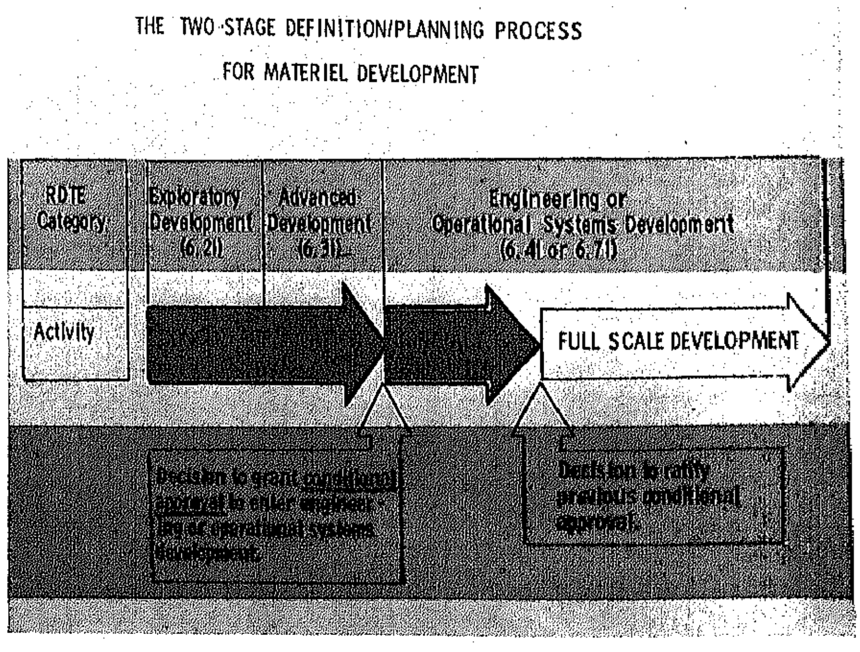


Figure 1.

substantial cost overruns that have historically plagued development projects are expected to be controlled in three ways. First, savings are expected by defining more precisely what is required. By this we mean that the Government must prepare system performance specifications during concept formulation, and that the contractors typically will develop detailed definition of both system and subsystem performance specifications during contract definition.

Second, costs will be controlled by employing fixed-price and fixed-price incentive contracts for development. Third, savings will accrue by closer attention to life-cycle cost considerations and the trade-offs between development, production, and maintenance and operation costs. Historically, little attention was paid during development to the impact of design decisions on production and operating costs. This impact is a major concern of contract definition, and substantial savings are expected to result.

Next, substantially fewer engineering changes will result due to better definition of system hardware and support items and their interfaces. Then, too, fewer program redirections and cancellations are expected to occur, because the technology required will have been demonstrated as being in-hand, *i.e.*, not dependent on scientific breakthroughs, and because better control of development projects will lessen the disturbing effects of reprogramming on the entire DOD weapons acquisition process. Finally, there will be greater force structure effectiveness through emphasis on system effectiveness in meeting mission objectives, and on cost-effectiveness analysis of competing systems to assure that funds will be committed where they will make the greatest contribution to achievement of the overall DOD posture.

Phases of Contract Definition

With this brief overview, let's examine the conduct of Phases A, B and C of contract definition in more detail.

Phase A. In Phase A, a request for proposal (RFP) for the conduct of contract definition on a competitive basis is released to industry by the Government. Contractors then submit two proposals which are a firm fixed-price proposal for contract definition, and a planning proposal for engineering development, plus projections for production, operation and maintenance costs of the system.

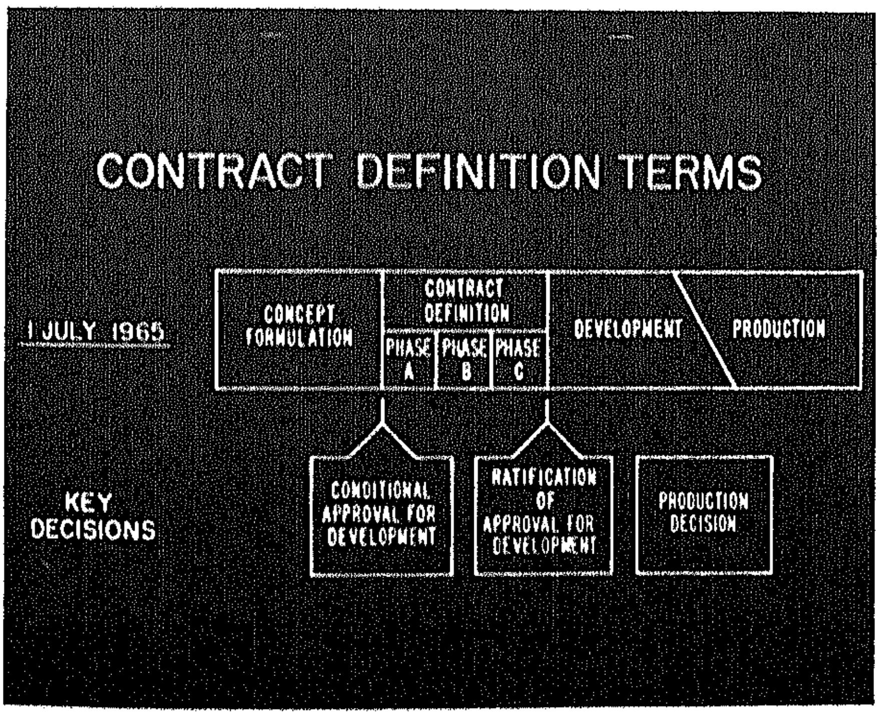


Figure 2.

Following the evaluation of the proposals, contractors are selected by the source selection authority. Usually, two or more contractors are selected to compete during the next phase. Firm fixed-price contracts for Phase B are then negotiated with each selected contractor.

Phase B. Moving on from the point of Phase B contract award, one should examine the outputs expected. The first output is a complete technical, cost and management proposal for development. In some cases, proposals can also include a portion of the production and logistics support procurement. A second output is the contract definition report which summarizes contractor activities and their results. This report supports the proposal for full-scale development. It can be quite extensive for the larger projects.

Next, let's examine some of the activities of the contractor under Phase B which lead to the two major outputs just mentioned. The first action is emphasizing intra-system trade-offs that will optimize operational effectiveness, total life-cycle costs, and project schedules. Second, performance specifications should be established which will permit design latitude of end items of the system during development within specified reliability and maintainability, and spell out minimum acceptable performance levels to guarantee the desired performance.

Third, the technical plan should identify risk areas and the plans for overcoming them, Also, the detailed work statements for the development contract should be submitted in formal contract language. Fourth, the management plan should include project organization, make-or-buy policy, subcontracting, and project control, as well as government-furnished equipment control methods. Fifth, detailed cost estimates should be based on the work breakdown structure and its derivative packages. Finally, the contractor should structure a fixed-price or incentive contract in which incentives should be established for items of high value to the Government, and should reflect system effectiveness and life-cycle cost considerations.

The foregoing discussion has emphasized the activities of competing industrial contractors during Phase B. During this period, the Government

provides equal guidance to all contractors and continues in-house tasks, such as revising and detailing the Technical Development Plan.

Phase C. Having completed Phase B, we now move to the next phase and examine the key steps accomplished in Phase C. Proposals are evaluated by the Source Selection Evaluation Board, within a goal of 18 weeks. Results are evaluated by a high level Source Selection Advisory Council, and alternatives are submitted to the source selection authority for decision.

Technical transfusion may be conducted to the extent of the Government's rights-in-data after the source selection has been made. Thus far, however, few items have been transfused due to "real life problems" which will be discussed later.

Changes are incorporated in proposals and the cost of these changes are negotiated with the winning contractor. If approved by the source selection authority, the contract for full-scale development is negotiated and executed. In certain cases, still other actions may be directed. These could include: select an alternate source, *i.e.*, a source other than those contractors competing in the Phase B activity; defer or abandon the development effort; or perform further definition or return to advanced development.

Actually, no Army program has yet followed this formal cycle just described in every respect. This is as it should be because of the very nature of research and development. The cycle must be sufficiently flexible to accommodate deviations which are necessitated by changes in requirements, major breakthroughs in the state of the art, and changes in urgency.

Many Ways of Doing Business with Industry

There have been numerous ways of doing business with industry in the development of materiel including the use of many different types of contracts.

Normal Contract Definition. Normal contract definition has been a real advance in the integrated planning for associated equipment, logistic and maintenance support, and personnel implications involved in the engineering of large systems. The advantages are:

- Good basis for competitive total package procurement.
- Good total price expected to result due to competition.
- Comprehensive planning.
- Design data derived during contract definition by competing contractors belongs to the Government.
- Better visibility provided by the comprehensive planning.
- Pure performance specifications permitting latitude for contractor action.

Total Package Procurement. Total package procurement (to include development, production and logistic support) combined with contract definition offers interesting possibilities in our continuing effort to get the most for the defense dollar. However, both contract definition and total package procurement have some inherent problems. Lack of enthusiastic response from industry was recently encountered when bids were requested involving both contract definition and total package procurement. Contractors were reluctant to commit their companies' resources for a period of five to seven years based on just paper studies.

Although pure performance specifications are emphasized as an output of contract definition, in reality contractors have found that detailed designs must be completed in order to prepare the required production, operation and maintenance cost estimates with a degree of accuracy sufficient to warrant the risk of their stockholders' investments. These detailed designs are not readily transfused and, consequently, we have not yet fully developed technical transfusion.

Expanded Contract Definition. Expanded contract definition, to include the fabrication and test of two parallel hardware approaches, provides some merit in overcoming the objections to the usual contract definition process. It is anticipated that industry will be less reluctant to commit its resources when it can more nearly see what its costs are. Over-concern on the part of industry with the risks of detailed design on paper only can then be somewhat overcome by more credible information resulting from actual test of hardware. Fabrication of prototypes can reduce risks, both for industry and the Government, before large commitments are made. Expanded contract definition, to provide for hardware fabrication and test, does cost more during development and requires more time. The added cost and time should be weighed against the benefits that competitive hardware development would provide.

Traditional Methods. Previous traditional development methods are not nearly so attractive as contract definition, although they do permit a better opportunity for the small contractor with limited system capabilities to compete in the development process. Principal disadvantages are: total package procurement is not always feasible; traditional methods lead to probable sole source procurement of first-year production, thus resulting in additional costs to the Government; and, finally, the Government accepts high cost risks through assuming total interface responsibility. Sole source should be resorted to only in those cases where pressing necessity requires such drastic and inevitably expensive means.

On selected development projects, AMC has proposed that the contract definition procedure be supplemented to add fabrication of prototype hardware and engineering design tests within the contract definition phase—to be followed by total package procurement. This would have the effect of extending the competitive period of contract definition into the initial stages of full-scale development. The additional development costs this will entail may well be justifiable in that it offers a better chance of assuring wider industry participation, of selecting the right approach, the best contractor, and a more credible cost for successful development.

Foreign Military Sales Pamphlet Available

A DOD pamphlet titled, "Foreign Military Sales Facts," which highlights the background of the Military Export Sales Program as well as details of some of the larger sales arrangements, is available without charge.

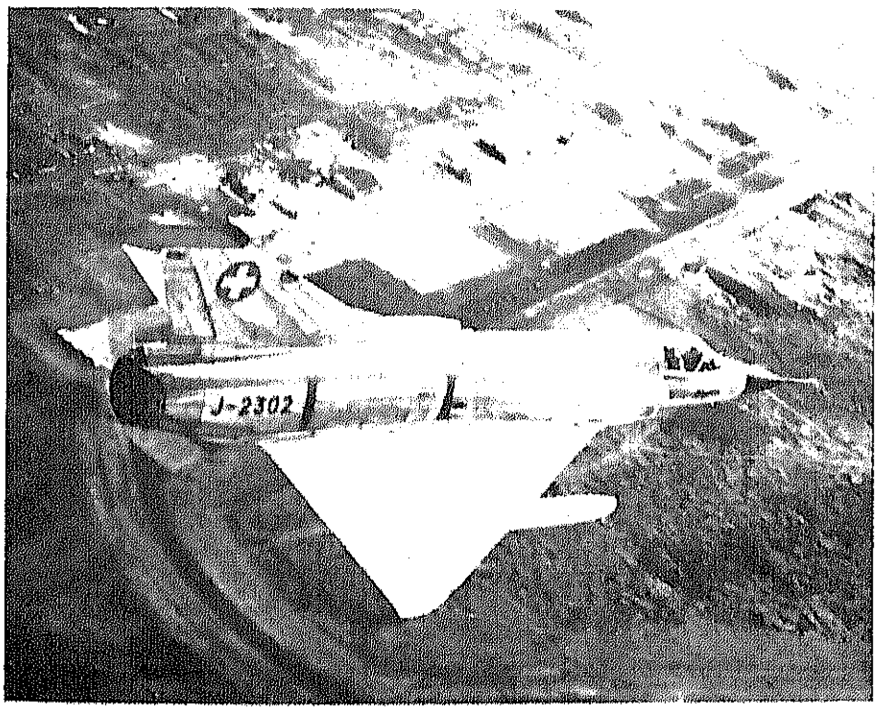
Requests for copies should be addressed to: Office of the Assistant Secretary of Defense (International Security Affairs), Attn: ILN, Room 4B 652, Washington, D.C. 20301.

The Technological War: Problems and Challenges

Superiority in Technology is Goal of Air Force Missile Development Center

Colonel George T. Buck, USAF

THE most startling thing about today's technology is the increased change of pace. It has been estimated that more than 50 percent of our current scientific knowledge was acquired in the last 20 years. The Air Force Missile Development Center (AFMDC), at Holloman AFB, N.M., is the scene of some of the most diverse research, development and test activities of the Air Force Systems Command (AFSC). A dynamic turnover of events is continually being experienced at this southern New Mexico military installation.



Lending an international note to the activities of the Air Force Missile Development Center was a group of Swiss aviators busy testing the Mirage III, a French-built, Swiss-owned aircraft. The aircraft was being married to a U.S.-developed fire control system. Tests at the center were conducted for over two years.

This is best illustrated by reviewing the mission activities of a typical day at the center. One single day finds armament crews readying aircraft with varying munitions loads. Recently, these could have been 750-pound bombs hung beneath one of the latest versions of the Phantom aircraft, the F-4D, or 2000 pounders clinging to a F-105. Soon, the armament crews will be working with the F-4 again, this time in tests of the Walleye missile. Then, the F-105 returns for tests of the Standard ARM missile.

On the same day a solid propulsion crew at the test track facility makes final checks on the big rocket boosters to drive the F-111 module down the famous Holloman 35,588-foot test track. This test is one of a series to determine the reliability of the aircrew escape system for one of the nation's modern aircraft—the F-111.

Some 50 miles south of Holloman, on the firing line at the U.S. Army's White Sands Missile Range (WSMR), another Holloman crew readies a rocket probe for launch. The crews annually launch over 100 rockets of many designs supporting the Air Force, Navy, Army and the National Aeronautics and Space Administration (NASA).

In the not too distant past, one of the most unusual aspects of the center's work proceeded on the flight line. There French and German accents mingled with southwestern drawls as an international crew readied the French-built, Swiss-owned Mirage III aircraft for flight tests over the

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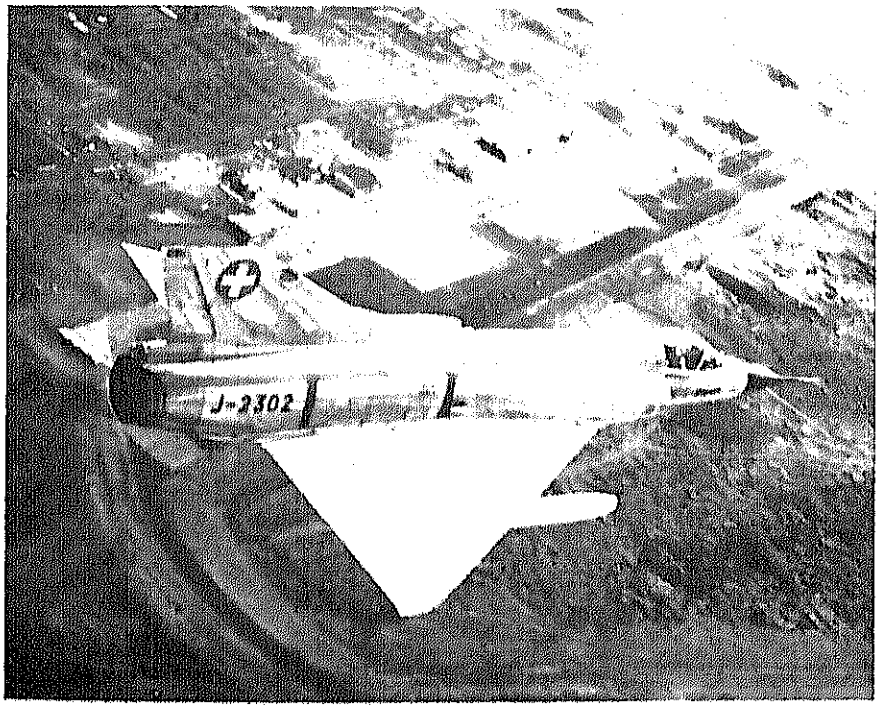

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WSMR. The international crew operated at Holloman for almost two years in a program designed to marry a weapon system built by Hughes Aircraft Co. to the Mirage III. Daily flight tests and numerous gunnery tests, along with many missile firings, qualified the Mirage III as a first-line aircraft for the Swiss Air Force. It is not too unusual to find British accents scattered across the base as both the Royal Canadian Air Force and the Royal Air Force have had projects at Holloman.

During the same period, the inter-Service aspect of the center's workload was demonstrated at the guidance test facility when an inertial navigator was readied for flight tests in a C-130 for the U.S. Navy. The tests consisted of three major phases: static pre-flight ground testing of the systems; aerial tests in a C-130 flying laboratory; and operational tests in either a F-106 (for fighter navigators) or a C-130 (for transport navigators). This facility is the focal point in DOD for test and evaluation of aircraft inertial navigation systems. The Navy will return this year for still other tests of yet another navigation item.

AS THE preceding brief summation of one day's activities illustrates the variety of mission activity at Holloman, a further look into its mission activities will reflect the dynamic, fast-moving chain of events at the center, and their contribution to the U.S. military technological superiority.

First, there is an extensive program in the launching of probes. Sounding rockets at Holloman lift atmospheric probes and parachute tests. Many of these tests are conducted at the center because of the extensive instrumentation and excellent payload recovery capabilities at the adjacent WSMR.

Also tests are sponsored by the Air Force Logistics Command for the improvement of the Air Defense Command's F-106 weapon system. These tests require careful control and concurrent plotting of the flight path of an aircraft, a drone target and a missile. Again, this is possible at the center because of the instrumentation facilities of WSMR.

Holloman was also the scene of RF-4C tests and the base/range complex is capable of testing any reconnaissance system in the future. Facilities are available for testing any type of sensor. To support this type of testing, the Air Force has installed a complex of ground targets, including an infra-red mapping range 200 miles long—extending from El Paso, Tex., to Santa Fe, N.M. It is the most complete aerial reconnaissance range in the United States because of available airspace, reconnaissance sensor targets, and range facilities that include accurate range instrumentation, telemetry facilities and data reduction.

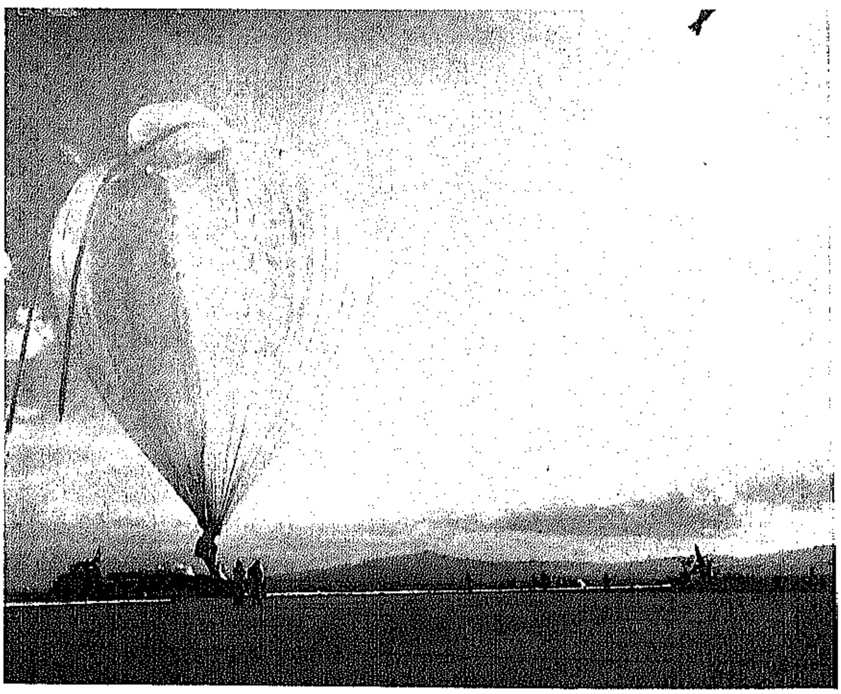
IN ANOTHER area the center tests and evaluates improvements to the drone target. The center is able to do this because of its complete data reduction and optical instrumentation facilities and their physical layout on WSMR.

In conducting these and other tests the Air Force uses over 35 percent of the total range time scheduled by WSMR and schedules nearly half of the total tests allocated for the range.

In support of many other projects, the 35,588-foot test track conducts over 350 tests a year—FY 1967 established a record with 478 tests. This includes testing of escape mechanisms, guidance systems, structures, and the effects of fuze impact, rain erosion, and blast and vulnerability.

Among the most dramatic test currently being conducted at the track are the rain erosion experiments. Rain erosion tests simulate rains of up to 12 inches per hour and provide controlled water droplet size. Rain erosion tests have been conducted for the Sandia Corp., the Army, Navy and Great Britain to determine effects on radomes and missile nose cones. A further series saw blast testing conducted for the Navy's Polaris missile test program.

Further elongation of the test track is now in the planning stage to meet future needs. This will enable high-speed, heavy-load test sleds to obtain the speed necessary and also have suf-

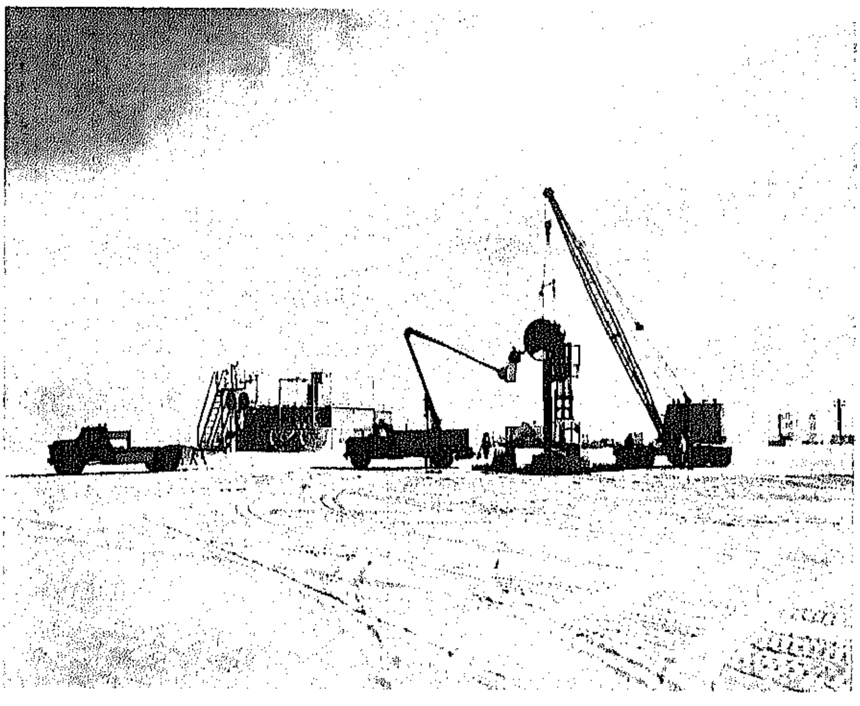


A giant balloon stands ready to be launched from the Air Force Missile Development Center by a launch crew from Detachment One, Balloon Research and Development Test Branch of the Air Force Cambridge Research Laboratories. Numerous balloons are launched each year by the detachment in support of many government research programs. A 26-million cubic foot balloon, the largest ever launched, was sent aloft from Holloman AFB on July 18, 1966.

ficient track distance remaining for deceleration to insure the safe recovery of the sled load. A state-of-the art advancement within this area was achieved in May of this year when a slim, aerodynamically shaped monorail vehicle established a new land speed record for a recoverable vehicle. The sled traveled more than six times the speed of sound reaching a velocity of 6,750 feet per second, or 4,600 miles per hour, during the 30,000-foot run down the track.

IN OTHER areas the center supports radar terrain avoidance tests to collect data on the operation and predictability of a system when exposed to variations in altitude, terrain and antenna incidence angle; turbulence studies in a program known as LO-LOCAT; the Athena missile firing program in support of the advanced ballistic missile re-entry systems program; tests on the inertial navigation system for the C-5A; various projects supporting the nation's Southeast Asia efforts; and component tests of an air-to-ground short range attack missile (SRAM). SRAM will be equipped with a guidance system which is expected to help it find its target with deadly accuracy, after pre-directed signals from a master navigator in the launch aircraft to start it on its way. The center will test the missile in its guidance laboratory, on the 35,588-foot track, in its Directorate of Aircraft and Missile Test, and at its Radar Target Scatter Site which will be discussed later.

Past support has been given to the Surveyor lunar soft-landing vehicle; to the Hound Dog missile; and to the ejection system for the OV-10A, the first hardware resulting from the LARA (Light Armed Reconnaissance Aircraft) or the FAC (Forward Air Control aircraft) concepts which the Air Force intends to use primarily in the FAC mission role. Other important future programs will be the testing of five inertial navigation systems for the Advanced Manned Strategic Aircraft (AMSA); the SRAM tests mentioned earlier; and tests of the Maverick.



One of many nose cones measured at the Air Force Missile Development Center's Radar Target Scatter Site is mounted on a styrofoam target support. Vehicles up to 55 feet long and as heavy as 6,000 pounds have been measured at the site. The scatter site complex is used to measure the static radar cross sections of actual or scale models of aerospacecraft such as nose cones, decoys and satellites.

A unique activity at the center is the Radar Target Scatter Site. It measures the radar reflectivity of both full-size and smaller-scale models of stationary bodies. It collects characteristic radar signatures reflected from weapon systems, nose cones, decoys and aerospacecraft. Moreover, the center operates an $18 million radar complex and participates in the collection of data on dynamic bodies. The data is processed through the center's completely equipped computation facility.

LENDING to the diversification in mission activities at Holloman are the mission activities of its many attached organizations. These units range in size from a two-man Navy liaison office to a presently deployed tactical flight wing of over 2,000 people. They differ in activities from the hard core of scientists of the Office of Aerospace Research to Army specialists in support of range activities.

First, there are two electro-optical surveillance facilities located near Cloudcroft, N.M. One, under development by the AFSC Electronic Systems Division, integrates into the USAF Space Track System under the operational control of the Air Defense Command. The second, operated by the AFSC Avionics Laboratory, develops equipment for tracking satellites.

There is also the Air Force balloon research and development test group of the Air Force Cambridge Research Laboratories, Bedford, Mass. The large balloon is an excellent vehicle for scientific research in that area of the earth's atmosphere between aircraft and satellite altitudes. The center's aircraft support this unit by monitoring the launch and cross-country flight path of the balloon. The aircraft also carry a truck and crew to recover the instrumentation packages.

Still another prominent unit is the 6571st Aeromedical Research Laboratory which trains animals for behavorial research, including the evaluation of the effects of various environmental conditions on biological specimens. This organization uses both the center's test track and environmental laboratory facilities. The en-

vironmental laboratory conducted tests, in coordination with NASA and the AFSC Aerospace Medical Laboratory and its chimpanzees, to determine if a pilot of a spacecraft would have sufficient time to bring back into the craft a fellow astronaut, who had torn his suit or broken his face plate during a space walk, to close the hatch, and to repressurize without a fatality.

The latest unit to join Holloman is the 4758th Defense Systems Evaluation Squadron of the Air Defense Command, whose mission is aimed at the degrading of Army ground radar systems from the air. Ground radar weaknesses are pinpointed and, as a result, improvements are made. The squadron also flies tow target missions for weapons practice and aircraft sorties to train radar crews in aircraft acquisition and tracking.

WITH this diversification, AFMDC and Holloman AFB have continued to grow together. Its strength is visible not only today but also is reflected in its future—a future which will contribute to our technological superiority and, in turn, to our military superiority.

In the future, the WSMR/Holloman complex, because of its unique geographical assets, could become one of the major sites for space activity. Fifteen miles west of Holloman lie the Alkali Flats, a 100-square-mile area, extremely flat, free of vegetation where the elevation varies less than 25 feet. This area is a potential land recovery site for orbital vehicles. It can accommodate an aerospace launch and recovery facility to test potential future space vehicles, designed for horizontal launch and landing, or a booster recovery evaluation facility to test scale model prototype or recoverable boosters in the Titan III and larger classes.

Presently a 38,000-foot landing strip is in use in the Alkali Flats. The area is large enough to accommodate several runways varying in length from 40,000 to 90,000 feet. The strip and the entire Alkali Flats are capable of supporting the weight of a B-52 aircraft.

Whether these ideas become actualities depend on many factors. Among them are technological breakthroughs, military requirements, economic factors, political factors, and international tensions.

As General McConnell has said, ". . . military superiority can no longer be achieved and maintained without overall technological superiority. As a result, we are engaged in a technological war which poses many problems as well as challenges. One of our most difficult tasks in that war is to assess accurately the technological capabilities of our opponents and to prevent technological surprise. Nor is it enough to try to keep up with the rapid progress of our opponents; we must retain the initiative and endeavor to stay far ahead of them. That is why we must have a vigorous research and development program." [1]

The variety of mission activities supported by both AFMDC and Holloman's attached units are testimony in themselves to our overall contribution to the research and development effort in maintaining U.S. technological superiority. To this end the personnel of Holloman and our total mission effect are dedicated.

[1] *Speech by General J. P. McConnell, Chief of Staff, U.S. Air Force, to the National Security Industrial Association, Los Angeles, Calif., Jan. 13, 1966.*

Colonel George T. Buck, USAF, is Commander of the Air Force Missile Development Center, Holloman AFB, N. M. Prior to assuming this command, he served as Director of the Air Force Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio. He is a graduate of the U.S. Military Academy and holds a Master of Science degree in aeronautical engineering from the University of Michigan.

Navy Releases Navigation Satellite for Commercial Use

Vice President Hubert Humphrey, Chairman of the National Council on Marine Resources and Engineering Development, has announced Presidential approval of a recommendation to release the Navy Navigation Satellite System for use by civilian ships, and for commercial manufacture of the shipboard receivers on an unclassified basis.

The recommendation was developed by the Navy in support of initiatives of the Marine Sciences Council to strengthen world-wide navigational aids for civilian use.

For the past year increasing interest has been shown in the system by the industrial oceanographic community, off-shore oil exploration companies, and other segments of U.S. industry interested in the commercial application of the system for ships requiring accurate investigation.

The Navy, therefore, will provide the National Security Industrial Association with the necessary technical information and documentation concerning shipboard equipment, for use on an equal basis by any interested U.S. party.

The all-weather satellite navigation system, referred to as the Transit System, has been in use since 1964 by the Navy.

The system consists of three elements: four ground tracking stations (located in Hawaii, California, Minnesota and Maine), the satellites in polar orbits at altitudes of 600 nautical miles, and the user equipment consisting of a sophisticated radio receiver and an associated computer.

The system was developed by the Applied Physics Laboratory at Johns Hopkins University.

Army Agency Renamed

The Army Corps of Engineers Geodesy, Intelligence, Mapping, Research and Development Agency has been renamed the U.S. Army Engineer Topographic Laboratory.

ABOUT PEOPLE

DEPARTMENT OF DEFENSE

Harry H. Schwartz has been assigned as Dep. Asst. Secretary of Defense (Near East and South Asian Affairs), Office of the Asst. Secretary of Defense (International Security Affairs).

Brig. Gen. Richard M. Scott, USAF, has been appointed Dep. Asst. to the Secretary of Defense (Atomic Energy).

Brig. Gen. Donald H. Cowles, USA, has been assigned as Military Asst. to the Asst. Secretary of Defense (Public Affairs).

Brig. Gen. W. E. Gernert, USAF, has been assigned as Dep. Commander (Weapons and Training), Field Command, Defense Atomic Support Agency, Sandia Base, N.M.

Col. Willis L. Helmantoler, USAF, has been assigned as Military Asst. to Dep. Asst. Secretary of Defense (Public Affairs) Daniel Z. Henkin.

Julian R. Levine, has been appointed Special Asst. to the Asst. Secretary of Defense (Public Affairs).

David C. Stewart has been designated Special Asst. to the Asst. Secretary of Defense (Manpower).

Col. Peter P. Adams, USAF, has been assigned to the Defense Communications Agency as Chief of the Data Processing Division.

Col. Benjamin C. Marshall, USAF, has been appointed Chief, Office of Industrial Security, Defense Contract Administration Services, Defense Supply Agency.

Col. Merle M. Zeine, USAF, has been named Dir. of the Defense Department's AIMS Systems Program Office, at Wright-Patterson AFB, Ohio.

DEPARTMENT OF THE ARMY

Maj. Gen. Frank G. White has assumed command of the Army Munitions Command, Dover, N.J., succeeding **Maj. Gen. Floyd A. Hansen,** who has retired. Gen. White was promoted to two-star rank upon assuming command.

Brig. Gen. James F. Hollingsworth is the new Dep. Commanding General, Army Test and Evaluation Command, Aberdeen Proving Ground, Md.

Col. Charles E. Kunkel has been assigned as Project Manager, General Purpose Vehicles, Michigan Army Missile Plant, Warren, Mich.

Col. Nelson A. Mahone Jr. has been named Project Manager for the Cayuse Project, at the Aviation Materiel Command, St. Louis, Mo.

Col. Arthur F. Pottle Jr. has been named Project Manager for the Lance Missile at the Army Missile Command, Huntsville, Ala.

DEPARTMENT OF THE NAVY

Charles F. Baird has assumed duties as Under Secretary of the Navy. Mr. Baird, former Asst. Secretary of the Navy (Financial Management), replaces **Robert H. B. Baldwin,** who has resigned from the post.

Randolph S. Driver has been appointed Dep. Under Secretary of the Navy (Manpower), succeeding **Richard A. Beaumont.**

RAdm. Jackson D. Arnold has been named Vice Chief of Naval Material.

RAdm. Francis D. Foley has been named Commandant of the Third Naval Dist., with headquarters in New York, N.Y.

RAdm. Paul E. Seufer has been named Dep. Commander (Planning), Naval Facilities Engineering Command.

RAdm. Nathan Sonenshein, has assumed duties as Dep. Chief of Naval Material (Logistic Support).

RAdm. Albert H. Clancy Jr. became Project Manager for the F–111B/ Phoenix Program on Sept. 16. He succeeds **RAdm. William E. Sweeney** who has retired.

Capt. Robert E. Adamson Jr. has been named Dep. Commander for Fleet Maintenance and Logistic Support at Navy Ship Systems Command headquarters, Washington, D.C.

Capt. Melvin R. Etheridge has been named Commanding Officer, Naval Weapons Center, China Lake, Calif.

Capt. Edward D. Franz has succeeded **Capt. Grover L. Rawlings** as Commanding Officer, Navy Maintenance Support Office, Navy Ships Parts Control Center, Mechanicsburg, Pa.

Capt. Robert I. Marr has been assigned duty as Project Manager, Naval Inshore Warfare Project, Naval Material Command.

Capt. Robert H. St. Clair has reported to Pacific Missile Range, Point Mugu, Calif., for duty as Dep. Vice Commander. He replaced **Capt. Thomas L. Andrews** who has moved to the position of Vice Commander.

Capt. John D. Working has relieved **Cdr. R. M. George** as Officer-in-Charge, Naval Ship Engineering Center, Philadelphia, Pa.

Capt. Mark W. Woods has been named Vice Commander, Naval Ordnance Systems Command, Washington, D.C.

DEPARTMENT OF THE AIR FORCE

Maj. Gen. Thomas K. McGehee, has been ordered to Air Force headquarters for duty as Asst. Dep. Chief of Staff (Programs and Resources).

Maj. Gen. William W. Veal has been named Commander, Sacramento Air Materiel Area, Air Force Logistics Command, McClellan AFB, Calif.

The following assignments have been made within the Air Force Systems Command:

Col. Sherman P. Cummings, Systems Program Dir., Long Lines Communications, Electronic Systems Div., L. G. Hanscom Field, Mass.; **Col. Dale D. Davis,** Dir., Air Force Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio; **Col. Robert L. Edge,** Dir., Space Defense Systems Program, Electronic Systems Div., L. G. Hanscom Field, Mass.; **Col. Albert P. Lovelady,** System Program Dir., Life Support SPO, Aeronautical Systems Div., Wright-Patterson AFB, Ohio; **Col. Otis A. Prater,** Chief, Systems Engineering Div., Special Weapons Center, Kirtland AFB, N. M.; **Col. John B. Shipp Jr.,** Commander Air Force Materials Laboratory, Wright-Patterson AFB, Ohio; **Col. Kenneth L. Skeen,** Chief, Munitions Test Div., Air Proving Ground Center, Eglin AFB, Fla.

The New Face of Contract Administration

Captain I. G. Cockroft, USN

Field contract administration in the Military Services has undergone rather dramatic changes, both in organization and in concept, in the past three years. This article discusses these changes, their evolution, and the need for recognition of the new, centralized contract administration organization.

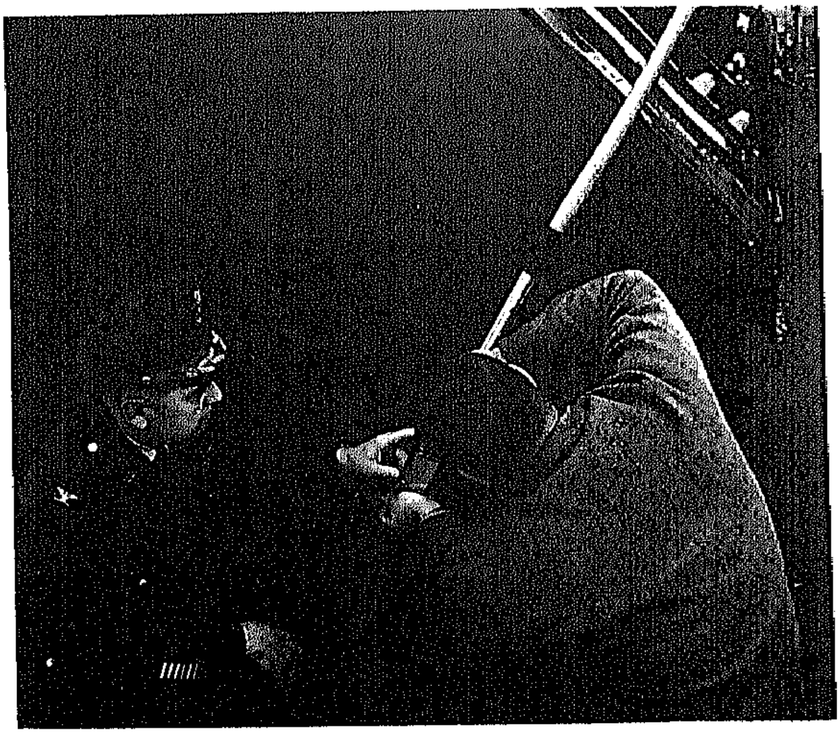
Contract administration, also referred to as contract administration services, consists of those actions that must be taken by the Government, vis-a-vis the contractor, from the time the contract is awarded until the material or services have been delivered and accepted, paid for, and the contract closed out. The functions range all the way from production surveillance, inspection, quality assurance and cost/price analyses on the one hand, to allowance of costs, change in order pricing, termination settlements, property management and contract close-out on the other. Once a contract is awarded, the contract administrator is the prime link between the contractor and the procuring or requiring activity.

The breadth of contract administration functions, and the time spans involved, are so considerable as to represent a major portion of the procurement cycle. Furthermore, the success of any procurement is often directly dependent on how well the contract administrator performs his job. Hence the importance of effective contract administration cannot be overemphasized.

Today's contract administration posture within the Defense Department was precipitated by a study, called "Project 60," initiated by the Secretary of Defense in 1962. Detailed analysis of the management of defense contracts indicated that the contract administration functions could be performed both more efficiently and more economically.

As a result of this study, the DOD Contract Administration Services Directorate was established under the Deputy Assistant Secretary of Defense (Procurement) in the Office of the Assistant Secretary of Defense (Installations and Logistics). In carrying out its responsibility for overall development and coordination of contract administration policy, the directorate has concentrated on developing a strong plant cognizance program, establishing DCAS (Defense Contract Administration Services), creating a contract administration review capability within the Office of the Secretary of Defense, and developing contract administration coverage in the Armed Services Procurement Regulation (ASPR). These efforts are oriented to the total performance of contract administration services by all DOD activities.

It is the policy of DOD that contract administration, in a given contractor's plant, will be performed by a single DOD component for all DOD contracts. This policy is effected by means of the plant cognizance program.



Colonel Gerald Johnson Jr., USA, Director, Defense Contract Administration Service Region, Philadelphia, Pa., and one of his quality assurance representatives at the FMC plant in Charleston, W. Va., check the road arm torque on the suspension system of the M113 armored personnel carrier.

The plant cognizance concept is not new. It actually had its beginning in 1938, when the Navy Bureau of Aeronautics made an agreement with the Army Air Corps to perform inspection at the Hamilton Standard plant in Connecticut. Plant cognizance at this early stage, however, was not so much a program as it was a series of individual agreements which provided for the work to be done, and which were effective only as long as desired by the parties to the agreements. Furthermore, these agreements involved only part of the many functions that are now routinely assigned to field contract administrators.

Over the years, inspection cognizance was assigned to a single Military Department at a large number of contractors' plants. Still, it was not uncommon for each of the Departments to have field offices in the same general area, all doing business with the same contractors. In fact, there were numerous examples where more than one Department had a field contract administration office in the same plant.

The plant cognizance program has corrected this situation. All field contract administration functions for any defense contract being performed in a given plant must be assigned to the component having cognizance of that plant. Thus, in the field administration of contracts, DOD through the plant cognizance has materially enhanced the "one face to industry" approach.

Field contract administration in the Defense Department is performed by two basic organizational elements:

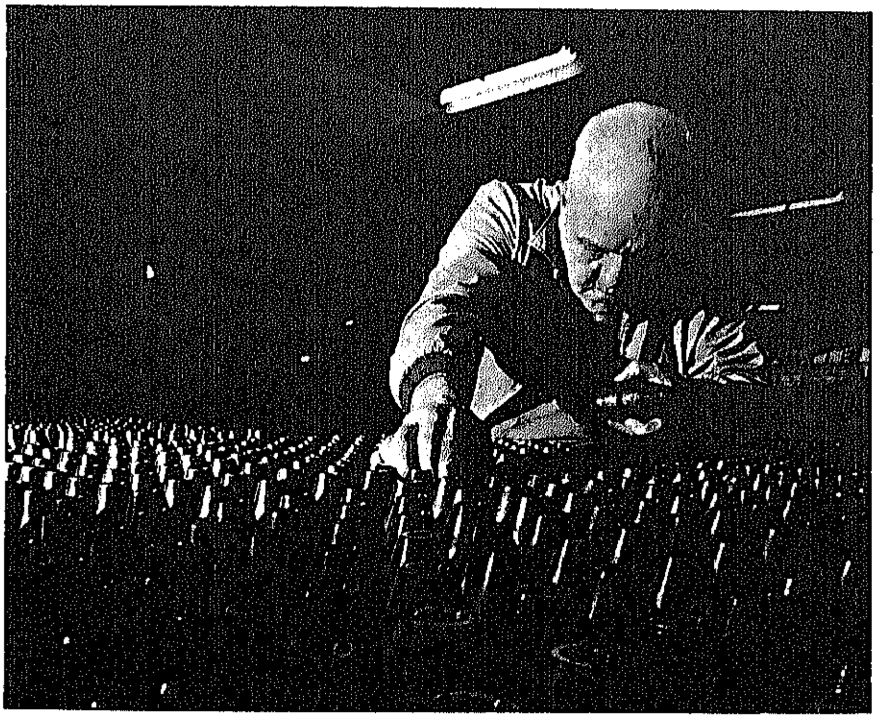
Military Department Plant Representative Offices. These offices are contract administration representatives of the Military Departments, assigned to individual contractor plants for the purpose of administering contracts for technical materials. For the most part, the plants assigned to the Military Departments are those producing major equipment and weapon systems or sub-systems that are of critical military importance, highly technical, and with limited application. Approximately 60 percent of the value of all defense contracts are administered by plant representative offices.

DCAS (Defense Contract Administration Services). Prior to 1963 each Military Department had its own contract administration organization to administer contracts for less complex, general purpose and subcontracted materials which were not assigned to a plant representative for administration. These organizations were set up on a regional basis, and there was a minimum of coordination of inspection or other functions among the different Departments.

It is in the organization for performing common contract administration services for other than the most complex weapon systems that major changes have been wrought, through the establishement of DCAS.

The DCAS organization also grew out of the Project 60 study. In October 1963, a pilot test of uniform contract administration procedures and policies was initiated in the Philadelphia area, using the combined resources of Army, Navy and Air Force contract administration field offices. Consolidation of contract administration offices followed rapidly in other geographic areas, and was completed in December 1965.

DCAS was organized as a component of the Defense Supply Agency, and is headquartered at Cameron Station, Alexandria, Va. Eleven regional offices have been established in Atlanta, Boston, Chicago, Philadelphia, New York, Detroit, Cleveland, St. Louis, Dallas, Los Angeles and San Francisco. Each region is subdivided into districts and includes plant and/or area offices, as necessary, in relation t[illegible] ance [illegible]



Thomas R. Markey, Chief Inspector of KVS Ammunition Plant, Danville, Pa., inspects 60mm mortar shells. As a company inspector his inspection system is monitored by a resident Defense Contract Administration Service quality assurance representative.

for about 200,000 prime contracts. (An additional 120,000 contracts are assigned for partial administration; most of these involve only material inspection.) Although many of these contracts are for general purpose, non-technical items, DCAS also administers contracts for complex equipment and components that require a high degree of technical expertise.

As one might expect, DCAS encountered many problems in assuming the DOD contract administration function.

Procedures. First was the fact that most of the DCAS personnel were familiar only with the contract administration procedures of their former Service. Each Service's procedures differed markedly. In fact, this was one of the main reasons for creating a unified contract administration agency.

Thus ex-Navy inspectors had to become familiar with the Air Force way of doing business, and ex-Army personnel had to study Navy methods. Of course, the obvious solution was development of uniform contract administration procedures that could be applied to all contracts. Such procedures were developed and issued in the form of DCAS manuals covering the various functions of contract administration, such as production and quality assurance. Ultimately many of these procedures are to be incorporated into the Armed Services Procurement Regulation.

Paperwork. The vast amount of paperwork that currently flows to and from the DCAS offices has presented a severe problem, not only to DCAS but also to other activities involved in the award and administration of contracts. Improved procedures and elimination of non-essential reports and forms will help. However, the best hope of ultimate resolution, or at least abatement, of this problem appears to lie in the introduction of MILSCAP (Military Standard Contract Administration Procedures).

MILSCAP will provide for an automated (and uniform) flow of data between contract administration offices and other interested activities, *e.g.*, procuring offices, consignee activities, paying offices, and other contract administration offices. Unfortunately, the complexity of this program is such that MILSCAP will not be fully implemented for some time.

Payments. Excessive delay in the payment of contractors' invoices was an unexpected and particularly vexatious problem during the early months of DCAS operation. However, DCAS has now reduced its invoice processing time to a nation-wide average of 11 days.

A major obstacle to further improvement is the difficulty of obtaining timely material acceptance documents. This particular problem will be alleviated by the introduction of MILSCAP which will call for rapid automated transmission and processing of acceptance documents whenever possible. Automated reporting of material receipt and acceptance, utilizing the Automatic Digital Network (AUTODIN), was instituted on a test basis between the Navy Supply Centers at Charleston and Oakland and the DCAS regional offices, and on Sept. 1, 1967, was expanded to all Naval activities with AUTODIN capabilities.

PCO/ACO Interface. Perhaps the most serious problem, and one that was inherent in the creation of a unified organization such as DCAS, was the establishment of smooth working relationships between the procurement contracting officers (PCOs) and the administrative contracting officers ACOs.

Captain I. G. Cockroft, USN, is the Quality Assurance Director at the Defense Contract Administration Services Region, San Francisco, Calif. He previously served as Director, Contract Administration Division, under the Deputy Chief of Naval Material (Procurement and Production), Naval Material Command, Washington, D.C.

Prior to DCAS, PCOs dealt for the most part with ACOs of their own Service. Thus PCOs and ACOs spoke the same language. They generally understood and appreciated each other's problems and objectives. Informal working relationships and procedures were developed to meet peculiar conditions. Under DCAS, a PCO often dealt with an ACO, who had previously worked for one of the other Services and who, therefore, was perhaps not familiar with the PCOs' requirements, problems and methods of doing business. Sometimes this unfamiliarity extended to technical matters, when ACOs were called on to administer contracts for items or equipment with which they had no previous experience.

The PCO could exercise direct control over his contracts but only at the expense of additional workload and further aggravation of the breach between PCO and ACO.

As DCAS "comes of age," more acceptance is apparent. Navy PCOs are recognizing the capability they have at their disposal in the DCAS organization and are assigning more and more functions to the ACOs. In some instances, procuring or requiring activities have finessed the "technical inexperience" problem by assigning technical specialists to DCAS offices for liason purposes, and to provide technical guidance and assistance to DCAS personnel.

From a workload standpoint, most PCOs can no longer afford to retain any function that can properly be assigned elsewhere. PCOs have assigned to DCAS offices such functions as:

- Pricing of change orders issued by PCOs.
- Placing orders for and pricing provisioned parts.
- Adjusting delivery schedules that prove unrealistic.

The foregoing are but a few of the many problems that DCAS has faced. Most of these problems are not susceptible to quick resolution by DCAS alone. They require a concerted effort over a long period of time, by all parties involved in the procurement

(*Continued on page 2?*)

The Technical Information Exchange

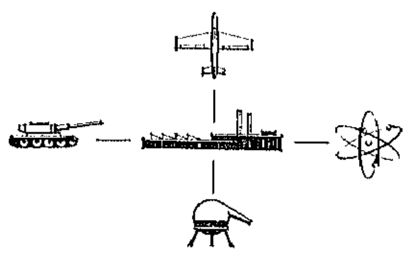
The Qualitative Development Requirements Information (QDRI) Program of the U.S. Army Materiel Command (AMC) is an information exchange program which enables industry and the Army to take advantage of the Department of the Army policy on scientific and technical information. It is the Army's policy to pursue vigorous, well organized, thoroughly coordinated, comprehensive information programs to provide for the interchange of technical information between the Department of the Army and the scientific and technical community to the maximum extent permitted by security.

Army installations create the QDRI documents, distribute the documents, qualify organizations, issue invitations to briefings, perform liaison between civilian and Army technical personnel and evaluate reports and unsolicited proposals.

QDRI documents, prepared by the Army to reveal the Army's research and development needs, are released to participators registered in the QDRI Program to enable these organizations to determine if they can help the Army fulfill its goals. On occasion, QDRI information is released in forms other than printed documents, as in the case of classified briefings.

Organizations which are registered in the QDRI Program ("qualified organizations") receive QDRIs and are also eligible to receive collateral documents which offer much valuable background data. These supporting documents are made available by the Defense Documentation Center, Cameron Station, Alexandria, Va., 22314. They enable the qualified organizations to create meaningful reports or unsolicited research and development proposals which are aimed at solving stated needs of the Army. While QDRIs are not often revised, on rare occasions they may be updated to reflect changes of objectives or reflect changes in the state of the art. QRDIs are assigned cut-off dates which are estimated to be far enough in the future to allow the recipients to evaluate and report on the QDRI, and to create an unsolicited proposal if they decide to do so.

Qualified organizations are not required to return old documents before receiving new ones. They simply destroy old QDRIs in accordance with paragraph 14 of the Industrial Security Manual for Safeguarding Classified Information.



QDRIs are not to be reproduced or disseminated outside of the receiving organization without written permission of the Development Directorate, U.S. Army Materiel Command, AMC RD–SSP, Washington, D.C. 20315, or the installation which published the QDRI.

Eligibility To Participate in the QDRI Program.

The QDRI Program is open to individual scientists, industrial, educational, or non-profit technical organizations with adequate research and development capabilities as evidenced by facilities, personnel and accomplishments, and who can meet Army regulatory requirements for integrity and reliability. Although it is not generally advisable, certain individuals and organizations with special abilities may be qualified for unclassified QDRI only. Canadian organizations which have been cleared and approved by Canadian Department of Defence Production may also apply for registration in the program.

Security Requirements.

Classified QDRIs can only be supplied to participants in strict accordance with established facility and individual security regulations. Some QDRIs are regularly released to qualified organizations at classified briefings. Therefore, usually only organizations which possess, or are able to obtain, security clearances are eligible to become registered in the QDRI Program.

Determination of Qualifications of an Organization.

All Army procurement offices, including special detachments which perform contract execution only, are involved in the QDRI registration process in connection with the establishment of research, development, technology and engineering (RDTE) bidders lists. DOD contracting and procurement activities include Defense Contract Administration Service (DCAS) districts and regions which are capable of informing applicants about registration procedures, and able to supply necessary forms and instructions.

The credentials which the applicant should supply are area of interest and capabilities, scientific and technical

personnel, facilities, related contracts, related "in-house" research and development effort, financial statement, and an executed policy agreement.

A procurement office will be selected as the registration office. West of the Mississippi Valley, it will be either the Northwest or Southwest Procurement Agency based on geographical considerations. East of the Rockies it will be a procurement detachment or a major procurement office in one of the Army's commodity centers based on a maximum match of commodity interests. Selection of the primary office of registration may be made either by a central Army referral office or by the applicant organization. A mutually agreeable arrangement will be made between the first Army office contacted and the applicant organization.

Registration offices will place firms with RDTE interests on appropriate bidders lists, and will insure that appropriate registration data is forwarded to all Army agencies with interests matching those of the registering organizations. QDRI managers in the Army's commodity centers and laboratories will qualify registered organizations according to their assigned missions. Where the selected procurement office is in a commodity center or commodity-oriented laboratory, the QDRI office in the installation will become the primary qualification office. The procurement agencies and detachments will also provide Army-wide qualification services for the organizations registered with them.

The prime qualifying office will be able to assist the applicant in selecting other agencies, such as arsenals and laboratories in other commodity centers, which should receive secondary registrations. The applicant will forward appropriate (generally identical) registrations, brochures and forms to the other agencies. Arsenals, laboratories and other RDTE agencies will conduct a technical review of each applicants qualifications, and will certify registration in appropriate scientific and technical categories. The applicant is then completely qualified to receive appropriate QRDI.

Approval or Disapproval of an Organization for Participation in the QDRI Program.

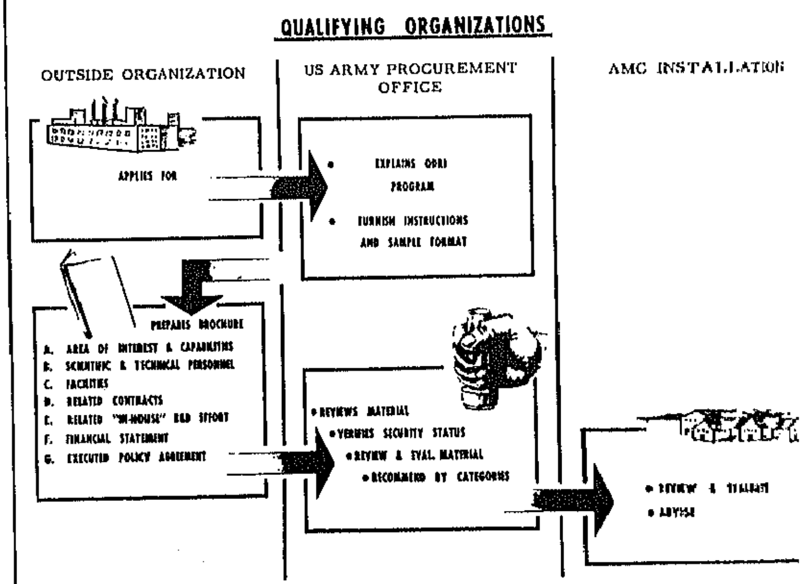
Initial approval or disapproval is given by the primary qualifying office which will hold the original policy agreement, a document expressing the terms under which the Army will accept the registration of civilian organizations in the QDRI Program. Confirmatory approval will be provided by each QDRI manager who accepts the registration data. As stated previously, each organization is still subject to approval for receipt of specific, especially classified, QRDIs. Evaluation boards or committees may be employed at the installation level.

Initiation of Participation in QDRI.

The prospective QRDI applicant must look to the major Army commodity centers (listed at the end of this article) for initial qualification actions. With the exception of the previously mentioned procurement agencies and detachments, all Army procurement districts have been completely converted to offices in the Defense Contract Administration Services organization and to procurement activities in commodity centers. Procedures are still being developed for DCAS participation in QDRI; however, plans are that DCAS will furnish mainly an information distribution center, referral, security clearance, and survey service. The documents to be prepared by industry include brochures containing organization credentials, a policy agreement, a security agreement, and the Research and Development Capability Index which defines fields of research and development interest for both RDTE bidders lists and the QDRI Program.

What is the Research and Development Capability Index?

As part of the qualification pro- cedure, the prospective qualified or- ganization completes a Research an Development Capability Index an other associated forms. The basic in- dex requests information about th internal structure of the applican organization. The associated form are a listing of most of the scientifi and technical disciplines (fields o interest). The applicant is obligat to carefully consider which of th many fields of interest apply to h organization. There is also an area f the applicant to indicate research an development categories for each fie of interest. These categories are th Office of the Secretary of Defen program categories now used in DC program plans: research, explorato development, advanced developme engineering development, operatio system development, or manageme and support.



The Research and Development Capability Index will be used in conjunction with a new Standard Form 129 and will be issued as a uniform requirement of the Armed Services Procurement Regulation. This index will be used for both the QDRI Program qualification lists and normal procurement-oriented research and development bidders lists. Some Army installations have this type of information semi-automated and others have it fully automated for fast and accurate production of mailings of announcements to appropriate bidders.

AMC is establishing a uniform automation program for the recording of QDRI data. This program will include the designation of a specific AMC installation as the central AMC data bank for QDRI.

Responsibilities of Qualified Organizations Receiving QDRI.

In the interest of national security, all organizations participating in the QDRI Program have a responsibility to report back, within 90 days, to the agency which issued the QDRI. This report should indicate whether the organization can contribute anything toward the solution of the QDRI. If an organization feels that it can contribute to the QDRI Program, it might develop an unsolicited proposal which is submitted to the QDRI manager at the address indicated on the QDRI.

How and Where To Submit Reports on QDRI Evaluations.

The first report is expected to be a letter, within 90 days of the QDRI publication, saying "We expect to submit an idea or solution." Negative reports are not required except in the case of classified requirements. If the idea or solution can be presented in 90 days, the letter is of course not required. Ideas or solutions may be presented at any time before the cut-off date on the QDRI to the installation originating the QDRI, unless other instructions are issued.

The report may be in any of the normal technical-report formats commonly used in industry. In the event that the organization has already explored the subject and possesses a report on the subject of the QDRI or a closely related subject, this report may be submitted in lieu of a newly created report.

If the report is sufficiently comprehensive (or can be modified accordingly) to be equivalent to an unsolicited proposal, the report may actually be submitted as an unsolicited proposal. All unsolicited proposals should be so labeled.

The following list contains the Army procurement offices and other Army RDTE offices which serve as the initial contact point for civilian organizations wishing to participate in the QDRI Program. When visiting these offices, ask to speak to the QDRI manager. In any case where a QDRI manager does not exist, it is appropriate to make contact with the Small Business Office.

U.S. ARMY COMMODITY CENTERS

Southwest Procurement Agency
55 S. Grand Ave.
Pasadena, Calif. 91105

Northwest Procurement Agency
1515 Clay St.
Oakland, Calif. 94604

U.S. Army Chicago Procurement Detachment
623 S. Wabash Ave.
Chicago, Ill. 60605

U.S. Army Cincinnati Procurement Detachment
Federal Office Building
550 Main St.
Cincinnati, Ohio 45202

U.S. Army New York Procurement Detachment
207 W. 24th St.
New York, N.Y. 10011

Headquarters, Army Electronics Command
Fort Monmouth, N.J. 07703

Headquarters, Army Missile Command
Redstone Arsenal, Ala. 35809

Army Tank-Automotive Command
Warren, Mich. 48090

Army Mobility Equipment Command
St. Louis, Mo. 63166

Army Engineer R&D Laboratories
Fort Belvoir, Va. 22060

Army Aviation Materiel Command
St. Louis, Mo. 63166

Army Aviation Materiel Laboratories
Fort Eustis, Va. 23604

Army Munitions Command
Dover, N.J. 07801

Edgewood Arsenal
Edgewood Arsenal, Md. 21010

Frankford Arsenal
Philadelphia, Pa. 19137

Picatinny Arsenal
Dover, N.J. 07801

Army Weapons Command
Rock Island, Ill. 61202

Rock Island Arsenal
Rock Island, Ill. 61202

Watervliet Arsenal
Watervliet, N.Y. 12189

Army Test and Evaluation Command
Aberdeen Proving Ground, Md. 21005

Army Ballistic Research Laboratories
Aberdeen Proving Ground, Md. 21005

Natick Laboratories
Natick, Mass. 01762

Army Materials Research Laboratory
Watertown Arsenal
Watertown, Mass. 02172

Harry Diamond Laboratories
Washington, D.C. 20438

DEFENSE PRIME CONTRACT AWARDS TO SMALL BUSINESS

(Amounts in Thousands)

	July 1966–June 1967	July 1965–June 1966
Procurement from All Firms	$40,608,892	$34,877,967
Procurement from Small Business Firms	8,360,725	7,611,496
Percent Small Business	20.6	21.8

New Policy Set for Announcing Defense Documents

The Technical Abstract Bulletin (TAB), issued by the Defense Documentation Center (DDC), no longer carries duplicate announcements of DOD scientific and technical reports appearing in U.S. Government Research and Development Reports (USGRDR).

DOD reports approved for public release and sale will now be announced only in USGRDR, which is available from the Clearinghouse for Federal Scientific and Technical Information, U.S. Department of Commerce, Springfield, Va. 22151, on a subscription basis.

DDC will provide its users with a copy of each issue of USGRDR and its index, "Government-Wide Index to Federal Research and Development Reports." TAB, which will now contain only announcements of those reports which are classified or controlled, will be supplied to those organizations accredited for classified service.

The change refers only to the announcement of reports and not to the availability of the reports themselves. DDC will continue to supply copies, for official purposes, of any DOD-sponsored report even though it is announced through USGRDR. Non-DOD reports listed in USGRDR will be available for purchase by DDC users directly from the Clearinghouse.

Both TAB and USGRDR are published twice a month.

AOA Chemical Biological Nuclear Annual Meeting Set

The annual meeting of the Chemical, Biological Nuclear Division of the American Ordnance Association will be held at Andrews AFB, Washington, D. C., Nov. 2–3, 1967. "CBR Research and Development Programs Needing Industry Support" is the theme of the meeting.

A banquet will be held on the evening of Nov. 2 at the Andrews AFB Officer's Open Mess.

For additional information contact: Norman I. Shapira, Litton Industries, Inc., 1875 Connecticut Ave NW, Washington, D. C. 20009, Phone: (202) 462–8833.

New Army Agency Supports DCS Project

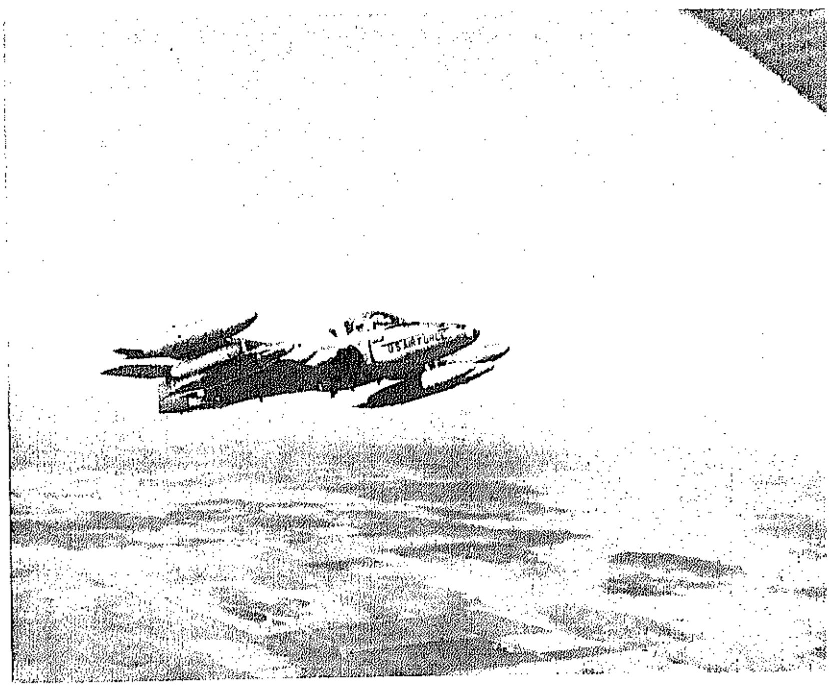
The U.S. Army has established a joint project management agency at Fort Monmouth, N.J., to facilitate a more rapid and effective response in the expansion and modernization of the Defense Communications System (DCS).

The newly created U.S. Army Communications Systems Agency (USACSA) will be under the command of Colonel Blaine O. Vogt, who will double as Army Materiel Command project manager in coordinating Army efforts for the DCS.

USACSA, a subordinate command of the U.S. Army Strategic Communications Command, will be responsible for the development and acquisition of strategic communications systems to meet requirements of a global network.

USACSA will be involved in research, engineering, development, procurement, production, distribution, installation and logistics of DCS projects.

New Attack Aircraft To Be Evaluated in Vietnam

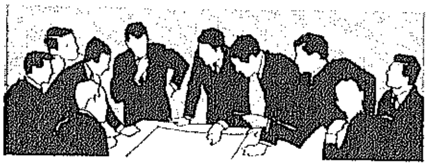


The Air Force will send a squadron of A-37 jet aircraft to Vietnam this fall for test and evaluation.

Built by Cessna Aircraft, Wichita, Kan., the A-37 is a lightweight, twin-engine, subsonic, low-wing ground attack aircraft designed for close air support of ground forces, interdiction, and limited warfare.

The 604th Air Commando Squadron will conduct the test and evaluation. Accompanying the squadron will be data collection and test evaluation personnel working under the direc of the Tactical Fighter Weapons C ter, Nellis AFB, Nev.

The team of analysts will ga information on manning, supply maintenance procedures, survivabi and operational effectiveness for in developing tactical air conc procedures, tactics and technique the use of the A-37 attack airc After the test, the squadron wil main in the Special Air Wa (SAW) force.



MEETINGS AND SYMPOSIA

OCTOBER

Second Electrofluiddynamic Energy Conversion Invitational Conference, Oct. 24-26, Wright-Patterson AFB, Ohio. Co-sponors: Office of Aerospace Research—Aerospace Research Laboratories, and European Office of Aerospace Research. Contact: Lt. Dale Smith, (ARE), Aerospace Research Laboratories, Wright-Patterson AFB, Ohio 45433, Phone (513) 255-4309.

Conference on **Unguided Rocket Ballistics Meteorology,** Oct. 30-Nov. 1, at New Mexico State University, Las Cruces, N.M. Sponsor: U.S. Army Electronics Command. Contact: B. E. Britain, Atmospheric Sciences Office, Atmospheric Laboratory, USAECOM, White Sands, N.M. 88002, Phone (505) 338-1006.

NOVEMBER

1967 Conference on **Speech Communication and Processing,** Nov. 6-8, at Boston, Mass. Co-sponsors: Air Force Cambridge Research Laboratories and the Institute of Electrical and Electronics Engineers. Contact: C. P. Smith, (CRBS), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01730, Phone (617) 274-6100, Ext. 3712.

Applied Superconductivity Conference, Nov. 6-8, at Austin, Tex. Sponsors: Army Research Office, University of Texas, NASA, Air Force Office of Scientific Research and the Office of Naval Research. Contact: W. H. Hartwig, Electronic Materials Research Laboratory, University of Texas, Austin, Tex. 78712; or Lt. Col. R. B. Kalisch, (SREE), Air Force Office of Scientific Research, 1400 Wilson Blvd., Arlington, Va. 22209, Phone (202) OXford 4-5518.

Tenth Navy-Industry Conference on **Systems Effectiveness,** No. 8-9, Washington, D. C. Sponsor: Naval Air Systems Command. Contact: Executive Secretary, Naval Air Systems Effectiveness Advisory Board, Code AIR-5205A, Naval Air Systems Command, Washington, D. C. 20360, Phone (202) OXford 6-5284.

Navy **Electronics Systems Classified Briefing** (Secret), Nov. 14-16, U. S. Navy Amphibious Base, Coronado, Calif. Sponsor: Electronic Industries Assn. Contact: Electronic Industries Assn., 2001 Eye St. NW, Washington, D. C. 20006, Phone (202) 659-2200.

Decomposition of Organic Metallic Compounds to Refractory Ceramics, Metals and Metal Alloys Conference, Nov. 28-30, at the Sheraton-Dayton Hotel, Dayton, Ohio. Sponsor: Air Force Materials Laboratory. Contact: Dr. Lynch, (MAMC), Air Force Materials Laboratory, Wright-Patterson AFB, Ohio 45433, Phone (513) 253-7111, Ext. 54145.

Sixteenth Annual **Wire and Cable Symposium,** Nov. 29-Dec. 1, at the Shelburne Hotel, Atlantic City, N.J. Sponsor: Army Electronics Command. Contact: Milton Tenzer, Electronic Parts and Materials Div., Electronic Component Lab., Army Electronics Command, Fort Monmouth, N.J. 07703, Phone (201) 535-1834.

DECEMBER

Theory of Measurement of Atmospheric Turbulence Conference, Dec. 5-7, at Sandia Base, Albuquerque, N.M. Co-sponsors: Army Electronics Command and Sandia Corp. Contact: Marvin Diamond, Atmospheric Sciences Office, Atmospheric Sciences Laboratory, Army Electronics Command, White Sands Missile Range, N.M. 88002, Phone (505, 338-1006.

Industry-Defense Meeting, **"Industry Responds to National Emergency,"** Dec. 7, Waldorf-Astoria Hotel, New York, N. Y. Co-sponsors: American Ordnance Assn. Eastern and Northeast Chapters. Contact: John S. Pink, American Ordnance Ass., 207 W. 24th St., New York, N. Y. 10011, Phone (212) OR 7-3030, Ext. 700.

DOD Procurement Conferences Scheduled

Three DOD Procurement Conferences of interest to small business and labor surplus areas will be held during the month of October. The Procurement Conference Program is part of DOD's continuing effort to develop additional competitive sources, large and small, to meet defense requirements.

The conferences are designed to provide:

- A single location for businessmen and potential contractors to become acquainted with the Federal procurement and contract process.
- Individual discussions with specialists on business opportunities in the Army, Navy, Air Force and Defense Supply Agency.
- Counsel on surplus sales and the activities of the Defense Contract Administration Service, the Defense Document Center, and other DOD organizations concerned with prime contracting and subcontracting.

Current Invitations For Bid and Requests for Proposals, including a number of "small purchase" ($2,500 and under) packages, will be available from Army, Navy, Air Force and Defense Supply Agency counselors at the conferences. In addition, a number of defense prime contractors, from the area contiguous to the conference site, will be available to discuss subcontract opportunities.

The dates and places of the conferences scheduled in October, including the individuals to contact concerning them, are:

Oct. 4—San Diego, Calif.
Contact:
John E. Harter
San Diego Chamber of Commerce
San Diego, Calif. 92101

Oct. 10—West Texas Area
Contact:
S. E. Burnett
Box 986
Kermit, Tex. 79745

Oct. 19—Louisville, Ky.
Contact:
James A. Beazley
Kentucky Department of Commerce
Frankfurt, Ky. 40601

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  76752 2D340

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- EXHIBITS BRANCH
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Calendar of Events

Oct. 3-6: National Defense Transportation Association-Annual Logistics Forum, Biltmore Hotel, Los Angeles, Calif.

Oct. 3-6: National Security Industrial Association Meeting, Washington, D.C.

Oct. 4: National AeroSpace Services Assn. Sixth Annual USAF Contract Aerospace Services Symposium, Imperial House North, Dayton, Ohio.

Oct. 4-5: American Ordnance Association (Value Engineering Div.) Meeting, Andrews AFB, Md.

Oct. 4-5: American Ordnance Association Annual Defense Preparedness Meeting, Jacksonville, Fla.

Oct. 9-10: Fifteenth Joint Engineering Management Conference, San Francisco, Calif.

Oct. 9-11: Association of the U.S. Army Annual Meeting, Sheraton-Park Hotel, Washington, D.C.

Oct. 9-11: Defense Supply Association Annual National Convention, Hilton Hotel, Washington, D.C.

Oct. 9-12: National Business Aircraft Association Meeting, Sheraton Boston and War Memorial Auditorium, Boston, Mass.

Oct. 10-12: Cleveland-Navy-National Security Industrial Association Scientific and Procurement Conference, Cleveland, Ohio.

Oct. 11-12. Institute of Navigation National Marine Navigation Meeting, Annapolis, Md.

Oct. 11-13: Army Aviation Association of America Meeting, Washington, D.C.

Oct. 16-17: Laser Range Instrumentation Seminar, Hilton-Inn, El Paso, Tex.

Oct. 16-18: Electronics and Aerospace Systems Technical Convention and Exposition, Sheraton Park Hotel, Washington, D.C.

Oct. 16-20: American Society of Civil Engineers Meeting, New York, N.Y.

Oct. 17-19: Lubrication Conference, Chicago, Ill.

Oct. 18-19: National Security Industrial Association Research and Development Symposium, Washington, D.C.

Oct. 19-20: National Conference on Fluid Power, Chicago, Ill.

Oct. 23-25: National Electronics Conference, Chicago, Ill.

Oct. 23-27: American Institute of Aeronautics and Astronautics Fourth Annual Meeting & Technical Display, Anaheim, Calif.

Oct. 24-26: Electronics Industry Association Meeting, Los Angeles, Calif.

Oct. 25-27: Electric Council of New England Meeting, Sheraton Hotel, Boston, Mass.

Oct. 26: American Ordnance Association Advanced Planning Briefing for Industry, Moline, Ill.

Oct. 29-Nov. 3: U.S. Civil Defense Council Meeting, Miami Beach, Fla.

Nov. 1-3: Northeast Electronic Research & Engineering Meeting, Sheraton Hotel and War Memorial Auditorium, Boston, Mass.

Nov. 1-4: Industrial Management Society Meeting, Chicago, Ill.

Nov. 13-15: Public Relations Society of America Twentieth National Conference, Bellevue-Stratford Hotel, Philadelphia, Pa.

Nov. 13-15: Conference on Electrical Techniques in Medicine & Biology, Statler Hilton Hotel, Boston, Mass.

Nov. 14-15: Technical Information Symposium, New York, N.Y.

Nov. 14-16: American Society of Tool and Manufacturing Engineers Regional Exposition, Sheraton Hotel and War Memorial Auditorium, Boston, Mass.

Nov. 14-16: Joint Computer Conference, Anaheim, Calif.

Nov. 15-16: Institute of Navigation Symposium on SST Operations, Seattle, Wash.

Nov. 26-Dec. 1: Radiological Society of North America, Chicago, Ill.

Nov. 28-Dec. 1: Wire and Cable Symposium, Atlantic City, N.J.

Dec. 3-9: Harvard College Advance Management Program, Statler-Hilton Hotel, Boston, Mass.

Dec. 4-6: AFL-CIO Biennial Conventions, Americana Hotel, Miami Beach, Fla.

Dec. 4-6: American Institute of Aeronautics and Astronautics Missile Systems Meeting, Monterey, Calif.

Dec. 5-9: American Nuclear Society Meeting, Chicago, Ill.

Dec. 6-7: Project Aristotle Conference, Washington, D.C.

Dec. 6-8: National Association of Manufacturers—72nd Congress of American Industry, Waldorf-Astoria Hotel, New York, N.Y.

Dec. 7: American Ordnance Assn. Area Industry Defense Meeting, Waldorf-Astoria Hotel, New York, N. Y.

Dec. 7-15: AFL-CIO Biennial Convention, Americana Hotel, Miami, Fla.

Dec. 14: Wright Memorial Dinner, Sheraton-Park Hotel, Washington, D.C.

Dec. 26-31: American Association for Advancement of Science, New York, N.Y.

Dec. 27-29: American Economic Association Meeting, Washington, D.C.

Dec. 27-30: American Statistical Association Meeting, Washington, D.C.

Electronics and Aerospace Systems Convention and Exposition Set

The 1967 Electronics and Aerospace Systems Technical Convention and Exposition, sponsored by the Aerospace and Electronics Systems Group of the Institute of Electrical and Electronics Engineers, will be held at the Sheraton Park Hotel, Washington, D. C., Oct. 16-18.

EASTCON '67 will present a varied technical program. In addition to regular sessions, three panel sessions are scheduled on "Command and Control," "Use of the Frequency Spectrum," and "All Digital Communications by 1980?"

The EASTCON exposition will feature a display of aerospace electronic hardware. The exhibits will embrace the full spectrum—systems, instruments and components—and are designed for the engineer, scientist and executive who represents industry and Government.

For registration and additional information the contact is:

EASTCON '67
Mr. E. J. Zillian
Western Electric Co., Inc.
1625 Eye St., NW
Washington, D. C. 20006
Phone: (202) 628-5443

Address by Hon. Robert A. Frosch, Asst. Secretary of the Navy (Research & Development), to the graduating class of the Defense Weapon Systems Management Center, Wright-Patterson AFB, Ohio, June 15, 1967.

Adam and Eve and Management

. . . I have the responsibility, for the Secretary of the Navy, of overseeing and generally controlling the work of project managers in the Navy. In the course of the past year I have been briefed by, and conversed with, many Navy project managers, and have had some opportunity to observe project management in the other Services. In large measure this experience has reinforced my previous views, and I would like to take this opportunity to tell you something about them.

To begin with, I may say that I consider management to be truly the oldest profession. I take biblical license for this view, believing that the first management instructions were those given to Adam and Eve concerning the management and operation of the Garden of Eden. The prototype administrative rule was "as for the Tree of Knowledge of good and bad, you must not eat of it." Characteristically this was not only the first instruction, but the first one that was violated. I imagine you are familiar with the consequences.

This was not only the first management instruction, but was a characteristic instruction; being phrased in the negative with consequences by implication. Perhaps the most difficult and least understood characteristic of the management problem is illustrated by this instruction. It is a characteristic of management rules and organization that far more attention is given to negative instructions, precepts and rules than to positive instructions on what the manager should do. The positive rules tend to come out clearly in favor of motherhood, God and country, whereas the negative rules are precise and definite. Managers are always abjured to be communicative, careful, economical, courteous, brave, clean and reverent on the positive side, whereas on the negative side it is generally explained to them in terms like "thou shalt not make cost-type contracts." This asymmetry persists in spite of the fact that management (as I conceive it) is: the art of arranging relations among people so that they are able to accomplish something. In spite of this basic underlying purpose, which is a "do," the asymmetry between general "do's" and specific "don'ts" always continues. . . .

It is reasonable to assume that there is some intrinsic difficulty in this asymmetry between the positive and the negative precept. I think that the asymmetry is connected with the difference between the past and the future, and the very nature of human life as an evolution into the future. The past is specific and definite, and what has happened has happened. The future that we are trying to construct is open, has infinite possibilities, and there is all sorts of room for creation and construction of new ideas. The negative precepts tend to embody advice against the mistakes of the past, whereas the positive precepts are attempts to construct the future better. As a result the negatives are precise, the mistakes of the past being well known, while the positives are not nearly so precise.

Neither the accomplishments nor the mistakes of the future are fully understood or well predicted. Thus, to my mind, the negative precepts embody guidance against what are believed to be the mistakes of the past, while the positive guidance tends to be general comments on what we hope will succeed in the future. As a result of all this, the great bulk of specific management injunctions (which are negative) are designed to prevent things from happening, whereas the generalizations, which are mostly positive, are the only things that give any guidance for what to do.

Hon. Robert A. Frosch

As a consequence, management instructions and administrative rules tie your hands, and most project managers seem to live in a perpetual struggle against other people's confining ordinances.

What is the End Objective?

Having defined management as being most interested in the positive arrangements for people, rather than in the negative prohibitions, I should like to talk to you now about the positive things that I think project managers should do. These are a result of my own observations of them as well as my personal experiences in being a project manager. I am afraid that I do not have a better crystal ball than others, so that I, too, will give positive generalities, but perhaps phrased from a different angle than the kind generally to be found in articles on management, and in that sense they may be of some assistance to you. . . .

The manager's main job is the construction of an end result. The real thing that we must try to do is to achieve the defined objectives. One difficulty that many managers have is connected precisely with this question: "What is the end objective?" The project manager is usually given (in the Navy at least) a Specific Operational Requirement (SOR) and a set of specifications.

Too many project managers begin by believing the SOR and those specifications to be the end objective. Unfortunately most of our specific operational requirements are not written in military terms. While they may be the result of a dialogue be-

tween military and the technological people (or of a trialogue between military, operational, technical and analytical people), they seldom come out written in terms of a military situation. They tend rather to express someone's ideas of the technical specifications to produce a device which will satisfy the requirements of the military situation that people had in mind, when they conducted the preliminary dialogues leading to the operational requirements. The specifications, of course, are merely an initial formulation of what should be achieved, and what everybody thinks could be achieved, during the course of the project.

Face to Face Dialogue

One of the nicest and commonest ways for a project manager to get into trouble is to believe that the SOR and the specifications are holy writ. Every Navy SOR has an escape clause that says: If you cannot meet the requirements of this document come back and talk some more. Nobody ever seems to use it. I urge you: at the beginning of your project initiate a dialogue with the operational people, and with the analytical people, so that you can steep yourselves in their feeling for the problem and they can become fully acquainted with your views on how to go about solving it. Please do not do this by initiating an exchange of letters or memoranda. Meet them face to face, talk with lots of operational and analytical people, have your staff participate, try to understand the problem from inside the minds of those who will have to operate the weapon. Keep doing this throughout the life of the project. This is time consuming, but I assure you it is more important than arranging for three-color slides for the TDP presentation to the Assistant Secretary. I will sense and be delighted by your intimacy with the military objective and how you plan to fulfill it. I see three-color slides many times during the day.

Let me put this requirement in the form of an aphorism:

The objective of the project is not the meeting of the specifications or the satisfaction of the operational requirement, but the solution to a military problem.

This initial statement introduces you to two other important points: The most important characteristic of a project manager is knowledge and the only way he can achieve this knowledge is by direct contact with the people who have it. I do not wish to suggest that you should not read reports and letters, as well as write them, and study the basic subjects involved in what is being managed. By all means you should do so. I am not a believer in the fiction that there is a thing called management that can be operated independent of any knowledge about that which is being managed. I believe that is nonsense. A good manager may start without knowing much about the particular subject, but he will, in the course of his work, acquire knowledge of that which he is managing. Without knowledge of the subject at hand, he may PERT, cost, and milestone his way happily along for years without ever getting to the heart of his problem.

I sometimes worry that the technology of management is distracting us from the real job at hand. Stick with the people. The documents, the memoranda, the charts, the computer programs do not do anything in your project. Only the people actually take the actions, make the decisions, and cause the program to be a success or a failure. The rest of the machinery is, at best, some assistance to them and to you in doing so. Do not be mesmerized by the machinery.

The Virtue of Committee Operation

Because I believe so strongly in the importance of the people in project management, I find myself believing in the use of committees, *ad hoc* or permanent. It is not fashionable to believe in committees these days. We are continually being told that a camel is a horse designed by a committee. I should note that for some purposes, such as crossing deserts, I prefer the camel to the horse, always assuming that I cannot have an Israeli tank.

Please note that I include the indi vidual as the unit case of the commit tee. By all means assign a job to a single individual and call him a com mittee, or to two, or to three, the number always depending on the na ture of the job, and whether the peo ple are good committee people or good individuals.

The virtue of committee operation is that it brings together people of different disciplines and temperaments to examine a common subject. Since all of our projects are multi-discipli nary, there is a good chance that more light may be shed by a group than an individual.

However, remember that the deci sion on the subject of the committee's deliberations should rightfully belong to you or to some other competent and suitable individual. The committee is best used as an advisory body and a deliberative body, rather than a deci sion-making body. The bad reputation of committees for arriving only at compromised solutions arises from misuse; the misuse of asking the com mittee to decide rather than to dis cuss, to devise ideas and, perhaps, to recommend. The skillful chairman will find his solution not necessarily in what the committee concludes, but in something that emerges in the course of deliberations.

Since you will use committees to advise and help you rather than to make conclusions, you can feel per fectly free about having nearly any one on the committee—mixing the contractors, the headquarters staff the laboratories and outsiders, as you choose. You need not be bound to give them precisely defined instructions and rules of conduct. Let them range freely over the material to use.

There are a number of books to be written on how to use committees in this way and nearly nothing sensible has come to my attention. If you can't figure out what to do, do some experi menting—an *ad hoc* committee can al ways be abolished. It may be painful to do so, but the committee member will know if they have failed and will probably suggest such a course of action to you. Most probably they will be enthusiastic about abolition.

Let me turn now from committees to some pitfalls and opportunities that you will face. As I have suggested projects run on information, and the kind that arrives typed, mimeo graphed, or printed isn't good enough

for a good manager. He should be using that only to tell him what information he really needs, and the information he really needs he will have to get by personal contact. Your most important basic information is, of course, who knows what about which, who you can trust, who will tell you without being asked, and who you should ask regularly. You can only find this out by paying attention to the people.

I do not generally sign things without reading them, but in a pinch I occasionally wish to, and I have a fairly good idea whose stuff it is safe to do this with, and whose I must really read in every case.

The Structure in which Information Moves

You must know that much about nearly everyone of importance in your project empire. In this regard you should realize, and certainly the military officers among you do, the distinction between the formal organization and the real organization. The formal organization, at any rate in the project and technological world, even in the Services, exists to define responsibilities, authorities, and the routes of paper that go with those defined authorities and responsibilities. The structure in which information moves, and in fact actions are taken, may be far different. You should be consciously aware of this, and use the informal and formal organization for their proper purposes. If you have the leeway, it is wise to reorganize your formal organization to fit the informal organization that develops, but you must be prepared to do this more than once at suitable intervals, generally following the rotation or change of a key man.

As a small digression, let me say that my belief in the existence and importance of the informal part of the organization is strong enough so that I have occasionally proposed using it as a basis for what I call stochastic reorganization. In this scheme one takes an organization that is not working well and proceeds to cut down its size by some arbitrary factor that must be chosen by judgment. Let us assume that the factor is one-half. In that case we make an alphabetical list of the people in the organization and flip a coin. If it comes out "heads" we start with number one; if it comes out "tails" with number two. What we do next is cross out the name of that individual (and this is the real key to it)—we abolish his job. We then tell everybody to go back to work, and sometime later, six weeks or six months depending on the organization's size and task, we examine what people are actually doing and relabel the organization diagram to conform. If the organization is still unsuccessful, perhaps we try the process again.

You will note that I have chosen a cut in personnel rather than an expansion. Most organizations suffer more from having too many people than from a shortage of people. I state this in spite of what project managers invariably tell me. Too much of the manpower is spent on doing formal jobs precisely instead of important jobs directly. When I see presentation charts or reports done in loathsome and unreadable detail instead of lucidly stating the main points, problems, and accomplishments, I am always reminded of Pooh-Bah's comment in "The Mikado" to the effect that "it was merely corroborative detail intended to add verisimilitude to an otherwise bald and unconvincing narrative." Someday I will have a sampler in my office that says, "Don't brief me, tell me what you know."

Returning to the formal and informal structures; use the informal structure for the real communication that it represents, reserving the formal structure for formal matters that put things into the record and deal with responsibility and authority.

At the same time if you are to succeed, you must be aware of two kinds of structural tendencies in bureaucracies. Both of these deal with human frailties and come about as a kind of amplification.

Amplification up the chain I call "management by rumor," and the Pentagon is very prone to it. A cold solder joint (or, I presume, a bad electron beam weld, these days) is discovered in the factory, and by some means someone outside the project, but reporting perhaps high up in the project chain (or even above the project manager), hears about it. Unless reasonable self-restraint is exercised, by the time the information gets to the project director or to me, or to the Director of Defense Research and Engineering, it becomes the kind of report that says: "Things are falling apart completely in the prototype construction, and a major management review is required."

Amplification Upward and Downward

Rumors are useful as sources of information, but it pays to track their background down carefully before starting a complete upheaval in the program. I suggest that information that comes via the informal organization should be checked via the informal organization before action is taken through formal channels. After being checked, it is frequently useful to have it regenerated through the formal system, and then replied to through the formal system, if indeed time permits for the formal steps. You can always document the whole thing for the record after you have fixed it.

The other amplification I simply refer to as amplification downward, and it comes about simply from the nature of the authority structure in a bureaucracy. I find that I must phrase my questions most carefully if catastrophe is not to ensue. The prototype case is the admiral who says to his chief of staff: "Say, Joe, whatever happened to Project X," expecting as an answer, "Oh that's going along very well, sir." Perhaps the chief of staff is not quite sure, and by the time the question has been passed down through several echelons the admiral finds himself listening to a two-hour briefing intended to allay his suspicions (which he never had) that the whole thing has fallen apart. A good deal of everybody's time and energy is wasted in this exercise.

There are two morals for the project manager. First: Beware of

generating this flap yourself; make sure a simple question is labelled as such. Second: Don't get caught this way yourself. Do not be ashamed of going back to higher authority to find out precisely what he had in mind, particularly if the original question got filtered through a couple of echelons on the way. I, for one, would rather spend the time explaining what I actually was thinking about than use the time of an entire project to generate a briefing that I don't want to hear, and then have to hear it. When I want a briefing or set of facts I try to ask for them explicitly. (If you think I'm not explicit enough come tell me, or send me a note or something.)

Along this line of comment, I may say that you should try to distinguish clearly between the information that you require in order to run the project properly, and the information that you require in order to convince your superiors that you are running the project properly. The two are not necessarily the same, though they ought to be, and confusing them may lead you to spend more time on the latter than you should, while skimping on the former. As a result you sell better than you produce, and this is as fatal as producing better than you sell. Keeping the conscious distinction in mind may help.

These last few comments may be summed up under the general advice, "don't manage for management's sake," if you can avoid it—perhaps the regulations will not allow you to. Do not introduce management controls and information techniques unless you want to exercise the controls or use the information. You have to be somewhat foresighted in this. You may want information later in the project that had to be generated in the beginning, but think these sytsems out before you apply them.

Remember, management and information controls help you, but they may prevent the people who have to do the work from doing it well, imaginatively, or in some cases at all. If you introduce these things, and we all must, as we need them frequently, make sure that the people who must carry them out have plenty of opportunity (and know they have plenty of opportunity) to express their views on how to do them, as well as a chance to suggest other ways of accomplishing the objectives better, and in simpler and easier ways. Make sure they know there is an informal communication chain. They may be afraid to use the formal one.

In this regard it is frequently useful to know, in an informal way, people who are far enough down the chain (or outside of it) in useful places that you cannot know them at all formally. The nature of the informal communication chain needs some building sometimes, although usually it is well adjusted by the nature of people. The worst thing that can happen to you is for you and your principal assistants to be outside of the informal chain entirely.

To a large extent the purpose of Special Assistants to an Assistant Secretary is to constitute a formal recognition of the fact that it is difficult for the Secretary to have informal access to the informal chain. Consequently he has assistants who, in fact, really are part of the informal communication system. The aides to admirals and secretaries also constitute an informal communication channel which has its uses. You might think about purposely, but discreetly and carefully, constructing similar arrangements.

So far I have been trying to help you to get things going and keep them going in a good and successful way. What about the case where somehow or other you have gotten into trouble? Perhaps it is real technological trouble that could not be anticipated. Perhaps it is a kind of external "act of God" trouble in the contract or elsewhere. Perhaps it is the result of a slip in management.

Tell the Boss When There is a Problem

My particular concern at the moment is not how you go about fixing it, but what you do or don't do about letting other people know there is trouble coming or that trouble is here. Don't be afraid to tell the boss there is a problem. Remember, it's his neck, too Maybe he can help; certainly, he will want to help. At the very least, even if it turns out that you made the trouble yourself, you will get credit for having the sense to know that y are in trouble.

There is nothing more disturbi and annoying to everyone involv than for the superior to find out tl there is serious trouble long after would have been easy for him to h with instructions, with contacts o he can make, sometimes even w money, manpower, and outside he After all, if you ask him for help a he doesn't give it in a useful w that makes him a part to the crin

Again, as a superior, don't mana for management's sake. I mean tl now not in terms of introducing u necessary techniques, to which I pre iously referred, but in terms of bothe ing the people who are working wh you don't need to. You must kn who to leave alone, when, and h long, and when to bother them agai Nothing but knowledge of the peo will tell you this.

Sometimes the most useful way make things happen is not to ta action, but to make it very clear th the management exists, that it is i terested, that it wants informatio and that it expects something to done. It may not even be necessa to direct what is to be done, but on to ask for information on the state to trigger a good deal of exercise the system. Be careful not to let th lead you into eruptions of amplific tion downwards.

With regard to these matters of r lationship with your superiors, o great defect of the project manag ment system is that project manage indeed many of their staff member tend to identify after a while wi their product. Sometimes they eve identify very closely with manufa turers or laboratories producing tl product, when instead they are su posed to be controlling them. Try preserve a certain detachment fro your job. It is true that you will ha to be the main defender of the proje but if you identfy only with its su cessful conclusion and end result, yo will not be able to carry out one the important functions of the pr ject manager, *i.e.*, the identificati of intrinsic failure of either the wh project or an approach in it.

Identifying that all or part of th project is on the wrong track a needs to be cancelled, changed ma edly, slowed down, reduced in fu ing, or increased in funding is t most important job for a proj

manager. If he identifies himself with the success of the product only as being his success, he cannot possibly carry out this job.

Captain Swede Momson, who was, before his retirement, a very sucessful guider of research in the Office of Naval Research, had for a long time a sign on the wall of his office that said, "The most important thing in research is the recognition and prompt burial of a dead horse."

The project manager must realize that his success may come from a recognition that a horse is dead or dying for reasons extrinsic to his own actions. Certainly, telling me, as the manager of Navy research, development, test and evaluation (RDT&E), and of the budget for that RDT&E, that something cannot be done, or is unwise, or would not fulfill the basic objective, is as great a service to the Navy and the country as producing an article that is possible. It is certainly a greater service than struggling on, spending time, energy and money trying to produce the impossible or unwise.

I would like to quote just one maxim that I think is most important, although it does not quite fit in with any of the things I have previously said. "Do not assume that the obvious has been done, everybody else is assuming that too."

In closing, let me return to my definition of management in terms of arranging things so that people can work. You should think of yourselves as something akin to a symphony orchestra conductor, to a ballet master, to the director of a stage production. You are conductors, leaders, in several senses manipulators of people. The management tools that you have learned are like the notation of music, the characteristics of the instruments, and the forms of the dance, or the script, or the notation of stage directions of a play. The important task is arranging things so that the people perform together with themselves, and with you, to do the job.

When the weapon is in the Fleet, the Army, or the Air Force, no one will read the TDP or review the PERT charts. They will want to know whether it helps in preserving the security of the nation. Your end result is what you and your teams have done, not the precise means by which you have done it.

OCD Urges Fallout Shelter Planning in New Buildings

The Office of Civil Defense (OCD), Department of the Army, has launched a new program designed to encourage architects and building owners to incorporate potential fallout shelter space in the initial design of new buildings.

Under the program, letters have been sent to building owners and architects, who are planning new construction projects, urging inclusion of fallout protection in the initial design.

To facilitate the inclusion of fallout protection in new buildings, OCD has developed a cost-reduction shelter-design techniques plan, which can be applied to structures without materially changing the building's appearance or function.

Examples of shelter cost-reduction design techniques are: reducing window areas and raising sill heights; judicious use of retaining walls and planter boxes; grading slope away from building; partially depressing buildings into the ground; arranging building modules to provide a protected core; filling hollow walls with sand or gravel; and many others.

The program will be started in Arizona, Florida, Louisiana, Massachusetts, Tennessee, Texas and Wisconsin. All schools to be constructed in the initial seven states will be included. Only owners of such other buildings as those valued at $200,000 or more, without basements, and $100,000, with basements, will be contacted.

The OCD has already located shelter for more than 159 million people in existing buildings. By use of modern low-cost shelter design techniques, it is possible to create additional shelter space for millions of others.

DOD Instructions and Directives Now Available Through Subscriptions

All new and revised DOD directives, instructions and changes (except those marked "For Official Use Only") are now available on a subscription basis.

For six dollars a year, subscribers will automatically receive one copy of each new issuance in the subject group requested. Subscriptions will be for a single major subject group. Additional subject groups will cost six dollars each.

Available subject groups are:

1000—Manpower, Personnel and Reserve
2000—International Programs
3000—Planning and Readiness
4000—Logistics and Resources Management
5000—General Administration
6000—Health and Medical
7000—Comptrollership
INDEX—Quarterly Listing of DOD Unclassified Issuances and Subject Index

Subscription requests should be forwarded to Director, Navy Publications and Printing Service Office, (Attn: Code NPA–1), Building 4, Section D, 700 Robbins Ave., Philadelphia, Pa. 19111, accompanied by a certified bank check or postal money order payable to the Treasurer of the United States.

The subscription service pertains only to the release of new and revised DOD documents. Previously published individual DOD directives and instructions, listed in the Quarterly Listing of DOD Unclassified Issuances and Subject Index, will be available without charge, one copy per request, from the Naval Supply Depot, Code 300, 5801 Tabor Ave., Philadelphia, Pa. 19120.

SELECTED DEFENSE DEPARTMENT ECONOMIC INDICATORS

(Dollars in Millions; Manpower in Thousands; Quarters by Calendar Year)

	1966 I	II	III	IV	1967 Jan	Feb	Mar	I	Apr	May	Jun	II	Jul
I. Military Prime Contract Awards													
Aircraft	$ 1,945	$ 2,989	$ 2,696	$ 2,262	$ 784	$ 788	$ 530	$ 2,102	$ 432	$ 1,240	$1,377	$ 3,049	$ 467 (p)
Missile & Space Systems	1,040	987	1,314	861	380	361	489	1,230	300	260	606	1,166	402 (p)
Ships	355	491	876	239	90	418	171	679	72	129	206	407	145 (p)
Weapons & Ammunition	555	1,486	692	940	346	215	257	818	279	518	972	1,769	209 (p)
Electr. & Communications Eqpt.	918	1,574	666	915	377	265	329	971	480	338	1,030	1,848	154 (p)
Other Hard Goods	843	1,842	660	1,029	267	305	343	915	298	362	904	1,564	144 (p)
Soft Goods	709	922	1,078	989	251	193	194	638	171	199	282	652	591 (p)
Construction	207	392	198	150	106	59	67	232	126	160	340	626	72 (p)
All Other	1,406	1,963	2,356	1,639	534	575	496	1,605	517	507	963	1,987	1,178 (p)
Total (Excl. of work outside U.S.)	7,978	12,646	10,536	9,024	3,135	3,179	2,876	9,190	2,675	3,713	6,680	13,068	3,362 (p)
Total, Seasonally Adjusted	8,703	10,144	10,716	10,149	3,338	3,849	2,984	10,171	2,920	4,121	3,626	10,667	3,561 (p)
Work Outside U. S.	521	1,195	856	672	183	112	158	453	227	228	379	834	320 (p)
II. Gross Obligations Incurred													
Operations	8,326	9,604	10,426	9,702	3,495	3,226	3,508	10,229	3,664	3,531			
Procurement	4,374	8,539	5,368	5,276	1,738	1,451	1,924	5,113	1,801	2,485			
Other	2,429	3,470	3,453	2,230	823	774	922	2,519	726	1,130			
Total	15,129	21,613	19,247	17,208	6,056	5,451	6,354	17,861	6,191	7,146			
III. Gross Unpaid Obligations [1] *Outstanding*													
Operations	3,828	3,777	4,792	5,024	5,041	4,892	4,644	4,644	4,761	4,765			
Procurement	18,023	22,119	22,736	23,173	23,134	22,982	22,780	22,780	22,613	22,947			
Other	5,747	7,392	8,179	7,888	7,858	7,834	7,626	7,626	7,453	7,628			
Total	27,598	33,288	35,707	36,085	36,033	35,708	35,050	35,050	34,827	35,340			
IV. Net Expenditures													
Operations	7,689	9,076	8,968	9,087	3,267	3,219	3,516	10,002	3,416	3,335	3,745 (p)	10,496 (p)	
Procurement	3,651	3,886	4,392	4,264	1,680	1,491	1,903	5,074	1,783	1,850	1,702 (p)	5,335 (p)	
Other	2,757	2,647	2,484	3,092	1,015	887	1,277	3,179	918	749	399 (p)	2,066 (p)	
Total	14,097	15,609	15,844	16,443	5,962	5,597	6,696	18,255	6,117	5,934	5,846 (p)	17,897 (p)	
V. DOD Personal Compensation													
Military	3,181	3,249	3,551	3,606	1,200	1,221	1,203	3,624	1,230	1,196			
Civilian	1,937	2,015	2,105	2,135	733	666	764	2,163	700	776	766 (p)	2,242 (p)	724 (p)
Total	5,118	5,264	5,656	5,741	1,933	1,887	1,967	5,787	1,930	1,972			
VI. Outstanding Payments													
Advance Payments	66	79	90	83				92				80	
Progress Payments	4,402	4,346	4,750	5,461				5,981				6,765	
V Loans	53	51	52	55				112				64	
Total	4,521	4,476	4,892	5,599				6,185				6,909	
VII. Strength (Manpower)													
Military	2,969	3,094	3,229	3,334	3,357	3,368	3,371	3,371	3,371	3,368	3,377	3,377	
Civilian	1,088	1,138	1,184	1,230	1,246	1,260	1,268	1,268	1,273	1,274	1,303	1,303	1,311 (p)

p—preliminary.

[1] Revised through May 1967 to exclude unpaid obligations involving revolving and management funds so as to be compatible with coverage pertinent to the "Gross Obligations Incurred" indicator.

NOTE: Open spaces for Indicators other than No. VI indicate information not available at time of publication. Indicator No. VI information available only on a quarterly basis.

Directorate for Statistical Services
OASD/Comptroller
30 August 1967

Project THEMIS

Thirty Universities To Do Research Projects for DOD

Fifty research programs have been selected by the Defense Department to be performed at universities located in 30 states and the District of Columbia under Project THEMIS during the 1967-1968 academic year.

Project THEMIS was initiated in January 1967 to develop new centers of excellence capable of solving future defense problems, and to provide wider geographical distribution of defense research funds.

All research programs under Project THEMIS, which has an initial funding authorization of about $20 million, will be unclassified. Funds for continuation of Project THEMIS support of the 50 pioneer programs and for an additional 50 programs have been requested by DOD for FY 1968.

Project THEMIS research centers and the titles of projects to be performed are listed below:

Detection, Surveillance, Navigation and Control

Georgetown University. Laser Technology.

University of Florida. Solid State Materials.

Iowa State University. Auto Navigation and Controls.

University of Kansas. Remote Sensing Instrumentation.

University of Minnesota. IR Detector and Laser Technology.

University of New Mexico. Radiation Effects on Electronics.

John Carroll University. Laser and Ultrasonic Radiation.

Ohio University. Low Level Navigation.

Oklahoma State University. Electronic Description of Environment.

Texas A&M University. Optimization Research.

Southern Methodist University. Automatic Navigation.

University of Virginia. Learning Control Systems.

Energy and Power

University of California at San Diego. Transport Phenomena in Flow Systems.

University of Delaware. Fluid Mechanics and Heat Transfer.

Florida State University. Geophysical Fluid Dynamics.

University of Minnesota. Gas Turbine Technology.

University of Missouri. Fluid Transport Properties.

University of Tennessee. Dynamic Scaling.

University of Utah. Chemistry of Combustion.

Information Sciences

Auburn University. Information Processing.

University of Florida. Logistics and Information Processing.

Louisiana State University. Digital Automata.

Dartmouth College. Time Shared Computing Systems.

Case Institute of Technology. Research on R&D Management.

University of Houston. Information Processing Systems.

Military Vehicle Technology

Georgia Institute of Technology. Low Speed Aerodynamics.

Notre Dame University. Deep Sea Engineering and Aerodynamics.

University of Massachussetts. Deep Sea Submersibles.

Mississippi State University. Rotor and Prop Aerodynamics.

Rutgers University. Separated Flow.

Material Sciences

Georgia Institute of Technology. Interface Phenomena.

Iowa State University. Ceramic Materials.

Stevens Institute. Nonlinear Physics of Polymers. Cryogenic Science and Engineering.

North Carolina State University. Materials Response Phenomenon.

Environmental Sciences

University of Hawaii. Astronomy Research.

University of Nevada. Cloud Physics.

New Mexico Institute of Minerals & Technology. Environmental Sciences.

SUNY—Albany. Modification of Environment.

Oregon State University. On Line Computer Environmental Research.

South Dakota School of Mines. Modification of Convective Clouds.

Texas A&M University. Meteorology Research.

Medical Sciences

Indiana University. Environmental Hazards.

Louisiana State University. Infectious Communicable Disease.

SUNY—Buffalo. Environmental Physiology.

University of Alaska. Human Ecology.

Social and Behavioral Sciences

Arizona State University. Human Performance in Isolation.

Kansas State University. Performance in Altered Environments.

University of Kansas. Social and Behavioral Sciences.

Texas Christian University. Human Pattern Perception.

Contract Administration

(Continued from page 12)

cycle. Similarly, many of these problems did not arise simply because of DCAS. The creation of a unified contract administration organization has highlighted problems of long standing; problems that could not even be clearly identified, much less resolved, as long as contract administration efforts were fragmented throughout DOD.

The contract administration components are making real progress toward the four objectives of Project 60: improved management of defense contracts, improved responsiveness to both buyers and producers, elimination of duplicate effort, and reduced operating costs.

Contract administration has indeed come into its own. The ACO, whose functions include vital advice and assistance in the formulation as well as in the administration of contracts, is as a co-equal member of the procurement team.

Item	Specification
Electronic Tube, FSN 5960–067–9364, Type 8370	*
Electron Tube, Types 5J26, 5R4WGB, 4J38, 6116, 817OW, 3B24WB, 2C46, 8252 and 5948A	*
Electron Tube, Klystron, Types 2K45 and 2K48	*
Electron Tube, Magtron, Types 2J50 and 2J51A	*
Electron Tubes, Types 6299, 6Y6GT, 7077, 7289 and 2K25	*
Generator, Handset, Telephone, in Accordance with Signal Corps Dwg 189375, Revision A	*
Handset, Battery Powered, Type H–67A	*
Headset, FSN 5965-548–4287	*
Loudspeaker, FSN 5965–243–0207	*
Loudspeaker, Permanent, Magnet, Type 1S–215/U, Signal Corps Dwg SC–DL–98482	MIL–L–13073
Microphone Cover, CW292U in Accord with Signal Corps Dwg SC–B–84239	*
Microphone Element, FSN 5965–698–0421	*
Mike, FSN 5965–698–0422	*
Potentionmeter Assembly, FSN 5905874–1798, O-zone Metal Dwg/Spec 220262–2	*
Receptacle, Quick Disconnect, FSN 5935–6 673–8388, Liquidometer Corp. Part No. B–298–5	*
Relay Assembly, FSN 5945–758–0977, Garrett Part No. 199960–6	*
Relay Armature, FSN 5945–069–6209	*
Register, Variable, Assembly, Army Missile Cmd Dwg 9053894	*
Register, Variable, Assembly, Topp Dwg 17609	*
Register, Variable, Assembly, Western Electric Dwg BL47537	*
Register, Variable, Assembly, Topp Dwg 18049	*
Register, Variable, Assembly, Ace P/N 162C–348	*
Register, Variable, Assembly, Ace P/N APO 8C5–1	*
Register, Variable, Assembly, Lear Siegler Dwg 600744–01	*
Register, Variable, Assembly, Ace P/N APO 8C5–1 IAW ITT Dwg 1065725	*
Register, Variable, Assembly, Ace P/N APO 5–C313–12 IAW GPL Dwg 121–631–003	*
Register, Variable, Assembly, Ace PN X500 IAW Motorola Dwg 18–14119A10	*
Register, Variable, Assembly, Ace P/N Ace Set 100K	*
Switch, FSN 5930–749–8964, White Diesel Dwg A115-620 per LSD–HR–41–63	*
Transformer, Power, FSN 5950–522–0851, GE Catalog No. 70G458, PIN 70G 458, GE Part No. 9T39Y4001	*

DEFENSE GENERAL SUPPLY CENTER

W. Reed Randolph
Small Business & Labor Surplus Specialist
Defense General Supply Center
Richmond, Va. 23219
Phone: (703) 275–3617

Item	Specification
Aircraft Cockpit Light, FSC 6220	MIL–L–6484B
Can, Water, FSC 7240	MIL–C–13984
Chaplin Kit, FSC 9925	MIL–C–43175, MS–16657, and MIL–C–43237
Charcoal, Activated	MIL–C–506
Chemicals, Photo FSC 6750	*
Cup, Paper, FSC 7350	UU–C–814A, UU–C–812A, and UU–C–815A
Cylinder, Gas, FSC 8120	*
Distress Marker Lights	MIL–L–23614A
Drum, Fabric, 500 Gallon, FSC 8110	MIL–D–23119A

Item	Specification
Electric Safety Lanterns	Various Part Numbers or Equal
Flashlight, FSC 6230–MX991, MX993, MX212	MIL–F–3747A
Floodlights	MIL–F–17696B and MIL–F–1712B
	*
Film, Photo, Aerial, B–W, FSC 6750	*
Film, Photo, FSC 6750	*
Gasoline Lanterns	MIL–L–1594D
Insular Strain FSC 5970	*
Light, Marker, Distress, FSC 6230	MIL–L–583D and MIL–L–23614A
Lighting Fixtures	W–F–00414B and MS19107
Magnesium Powder, FSC 6810	JAN–M382A and MI–P–14067A
Opener, Hand, Can, FSC 7330	FF–O–00605
Paper, Photo, FSC 6750	*
Sewing Machine, Industrial, FSC 3530	OO–S–256C
Steel Strapping, FSC 8135	QQ–S–781E
Tape, Pressure, Sensitive, Adhesive, FSC 8135	*
Terminal Boxes	Various Drawings

DEFENSE INDUSTRIAL SUPPLY CENTER

Sidney Charles
Small Business & Labor
Surplus Specialist
Defense Industrial Supply Center
700 Robbins Ave.
Philadelphia, Pa. 19111
Phone: (215) 697–2747

Item	Specification
Block & Tackle, Slings, FSC 3940	*
Electrical Wire and Cable, FSC 6145	*
Fibre Rope, Cordage and Cotton, Twine, FSC 4020	*
Fittings for Rope, Cable and Chain, FSC 4030	*
Molded Rubber Products, FSC 5330	*

DEFENSE PERSONNEL SUPPORT CENTER

Samuel R. Todd
Matthew E. Kryston
Hubert L. Smoczynski
James L. Calvert (Subsistence)
Small Business & Labor
Surplus Specialists
Defense Personnel Support Center
2800 South 20th St.
Philadelphia, Pa. 19101
Phone: (215) 271–2623; 271–2638; 271–2728 or 271–2704

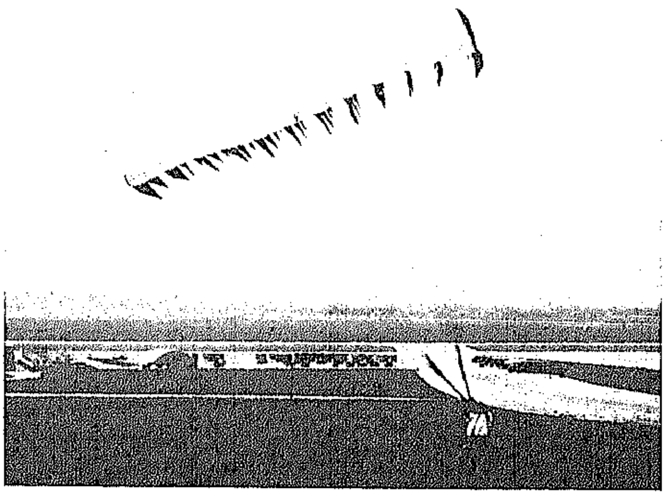
Clothing & Textile

Item	Specification
Boot, Flying, Impact Resistant	MIL–B–21408
Buton, Insignia, Metal	MIL–B–3461
Coat, Fireman's, OG–107	MIL–C–10750E
Coveralls, Safety, Heat Protective	FAC/NS 634
Gloves, Protective, Fire Fighters	MIL–G–27339
Gloves, Toxicological, Butyl Rubber	MIL–G–12223
Helmet, Combat, Vehicle Crewman's	MIL–H–43059
Hood, Fireman's Asbestos	MIL–H–25630
Mask, Surgical, Fibrous Glass, Disposable	MIL–M–36431
Mask, Surgical Gauze	DDD–M–136
Mask, Surgical, Non Woven, Disposable	MIL–M–36168
Mattress, Bed, Foam, Rubber	MIL–M–18351
Overshoe, Man's, High Black	MIL–O–836
Raincoat, Women's, Coated Nylon AF	MIL–R–38252
Shoe, Dress, Women's	MIL–S–21711
Suitcase, Cotton Duck	USAF Dwg SZK6757
Sweatpants, Silver Grey	BBB–S–860A
Trousers, Safety, Heat Protective, Asbestos MB–1A	MIL–T–4633

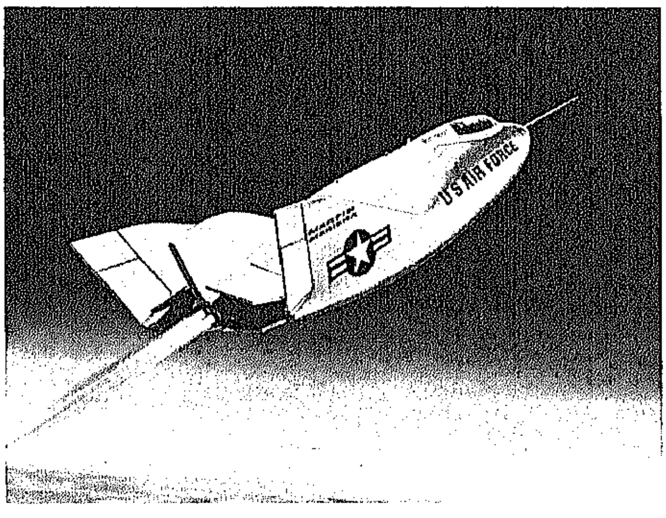
Medical**

Item	Specification
Bath, Parafin	P/D#7, 27 Sep 66
Blade, Laryngoscope, Infant, MacIntosh 87mm	P/D#1, 21 Feb 66
Blade, Laryngoscope, Large Adult, MacIntosh, 158mm	P/D#1, 21 Feb 66
Box, Microscope Slide, Plastic, 100 Slide	P/D#2, 20 Jan 66 NNN–B–005 85 (DSA–DM)

Item	Specification
Cannula, Uterine, Corrosion Resistant Steel	P/D#2, 17 Apr 64
Dispenser and Counter, Narcotic Capsule Tablet	P/D#2, 28 Oct 64
Impression Material, Dental, Hydrocolloid, Alginate Type	P/D#5, 25 Oct 65
Locater, Radiographic, Ocular, Foreign Body	P/D#4, 1 Apr 66 and GG–L–56A 29 Oct 60
Reamer, Medullany Canal, 10mm diameter	P/D#4, 8 Jan 66
Reamer, Medullany Canal, 9mm diameter	P/D#4, 8 Jun 66
Resin, Acrylic, Denture Base Repair, Pink, 250 gm	P/D#12, 28 Feb 67
Stapcock, Intravenous Therapy, 3 way Plastic, Disposable 50s	P/D#4, 6 Oct 64
Suction and Pressure Apparatus, Surgical, Explosion Proof, Single Compressor, Mobile	P/D#11, 26 Jan 67
Tube, Blood Collecting, Vacuum, Sterile, with Anti-coagulant 50s	P/D#13, 23 Oct 65, MIL–T–36191, 12 Jan 65
Subsistence	
Bacon, Prefried, 22 oz. can	MIL–B–35032
Bread, Canned	MIL–B–1070D
Fish Squares, Dehydrated	MIL–F–43142
Ham, Slice & Fried, 5-1/2 oz. can	MIL–H–1071
Ice Cream Mix, Type I, Dehydrated	MIL–I–705
Juice, Orange, Instant	MIL–J–35049
Peppers, Green, Dehydrated, 2-1/2 cans	MIL–P–35003
Pork Steak, 5-1/2 oz. can	
Pork Chops, Dehydrated, Raw, 307 & 710 can	MIL–P–43144
Pork Sausage, Canned, Links	MIL–P–1104
	MIL–P–1069
Pork Steak, 5-1/2 oz. can	MIL–S–1049,
Soup, Dehydrated	MIL–S–3059, MIL–S–35046, MIL–S–35051 and MIL–S–3271



An engineer of the Air Force Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio, demonstrates the lift capability of the rectangular para-foil parachute. The para-foil, equipped with on-board guidance and control units, is being tested by the laboratory for accurate delivery of cargo. Designed to be guided to a pinpoint landing, it can glide nearly three feet horizontally for each foot of vertical drop. The steerable parachute will deliver 2,000 pounds of cargo dropped from aircraft at speeds of 130 knots at altitudes of 15,000 feet. Harley Walker is project engineer for laboratory tests of the para-foil.



The X-24A, designed and built by the Martin-Marietta Corp., Baltimore, Md., is the Air Force's newest flight research vehicle. It will be used in the forthcoming Piloted Low-speed Tests (PILOT) Project directed by the Aeronautical Systems Division (ASD), Wright-Patterson AFB, Ohio. The purpose of the project is to develop technology to support future requirements for a manned, lifting body reentry vehicle capable of returning from space and landing at a designated site of the pilot's choice. Douglas E. Ringwall is ASD's program manager for the X-24A and the PILOT project.

RESEARCH REPORTS

Authorized DOD contractors and grantees may obtain these documents without charge from:
Defense Documentation Center
Cameron Station
Alexandria, Va. 22314
Others may purchase these documents at the price indicated from:
Clearinghouse for Federal and Scientific Information
Department of Commerce
Springfield, Va. 22151

Stilbene Spectrometer for Neutrons and Gammas: Electronics and Related Performance. Ballistic Research Laboratories, Aberdeen Proving Ground, Md., for the Defense Atomic Support Agency, Sept. 1966, 165 p. Order No. AD-644 448. $3.

Higher Order Elastic Coefficients for Crystals: The Third-Order Elastic Stiffness. Army Electronics Command, Fort Monmouth, N.J. Aug. 1966, 23 p. Order No. AD-642 844. $3.

New Concepts in the Physics of Solids, a Monograph. Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass., Aug. 1966, 94 p. Order No. AD-645 890. $3.

Beta Spectra V. Spectra of Individual Positron Emitters. Naval Radiological Defense Laboratory, San Francisco, Calif., Nov. 1966, 134 p. Order No. AD-646 228. $3.

A Fortran IV Program to Derive the Equations of Motion of Systems. Air Force Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio, Sept. 1966, 130 p. Order No. AD-648 720. $3.

Study of Alumina Crystal Structures (Automation of the Verneuil Process). University of Michigan, for the Air Force, March 1967, 25 p. Order No. 649 161. $3.

Measurement of the Velocity Distribution Function of a Gas Using A Laser. Stanford University, for the Navy, May 1966, 78 p. Order No. AD-638 795. $3.

Some Factors Affecting the Growth of Beta Selicon Carbide. Air Force Cambridge Research Laboratories, Bedford, Mass., Sept. 1966, 23 p. Order No. AD-645 649. $3.

Investigation of Two-Carrier Injection Electroluminescence. RCA, for the Air Force, Dec. 1966, 47 p. Order No. AD-647 087. $3.

Physical Research on Fundamental Properties of II-VI Compound Semiconductors. Brown University, for the Air Force, Nov. 1966, 75 p. Order No. AD-649 242. $3.

Relation of Mechanical Properties to the Structure of Ionic Solids, Pennsylvania State University, for the Army, Sept. 1966, 41 p. Order No. AD-641 911. $3.

Effects of Radiation on Semiconductor Materials and Devices. Bell Telephone Laboratories, New York, N.Y., for the Air Force, Dec. 1966, 256 p. Order No. AD-650 195 $3.

Deep-Ocean Biodeterioration of Materials—Part IV. One Year at 2,370 feet. Naval Civil Engineering Laboratory, Port Hueneme, Calif., May 1967, 65 p. Order No. AD-651 124. $3.

Evaluation of Vehicle Corrosion Preventives. Rock Island Arsenal, Ill., Dec. 1965, 37 p. Order No. AD-476 493. $3.

Thermophysical Properties of High Temperature Solid Materials. Purdue University, for the Air Force, Oct. 1966, 35 p. Order No. AD-648 235. $3.

Mercury Atmosphere and Surface. Redstone Scientific Information Center, Redstone Arsenal, Huntsville, Ala., Jan. 1967, 89 p. Order No. AD-650 033. $3.

Summary of AFCRL Rocket and Satellite Experiments (1946–1966). Air Force Cambridge Research Laboratories, Bedford, Mass., Dec. 1966, 65 p. Order No. AD-649 333. $3.

Bibliography of Lunar and Planetary Research—1965. Air Force Cambridge Research Laboratories, Bedford, Mass., Jan. 1967, 183 p. Order No. AD-648 463. $3.

Landau Waves. Stanford University, for the Aerospace Research Laboratories, Jan. 1967, 158 p. Order No. AD-651 461. $3.

A Generalized Graphic Presentation of Magneto-Hydrodynamic Accelerator and Generator Performance Characteristics. Arnold Engineering Development Center, Arnold AFB, Tenn., Oct. 1965, 45 p. Order No. AD-472 727. $3.

An Inventory of Geographic Research of the Humid Tropic Environment, Vol. 2—Compendium and Appendices. Texas Instruments, Inc., Dallas, Tex., for the Army, Dec. 1966, 500 p. Order No. AD-650 261. $3.

Remote Sensing of Environment. University of Michigan, for the Navy, April 1967, 28 p. Order No. AD-650 581. $3.

Large Aperture Seismic Array (LASA), First LASA Systems Evaluation Conference. Advanced Research Projects Agency, Washington, D.C., Feb. 1966, 300 p. Order No. AD-648 415. $3.

GOVERNMENT PRINTING OFFICE PUBLICATIONS

These publications may be purchased at the prices indicated from:
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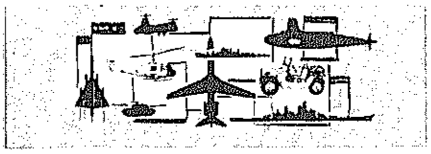
MILSTRIP, Military Assistance Program Addresses, Supplement No. 2, Dec. 1, 1966. Contains complete listing of addresses used by the Services and Agencies to accomplish shipments of Foreign Military Sales and Grant Aid material. 1966. 331 p. Catalog No. D7.6/4:M59/supp. 2. $1.75.

Communications, Telecommunications Engineering Installation Practices. Provides instructions for engineering and installing line-of-sight radio communications systems in accordance with the requirements of the Defense Communications System and the Army Strategic Communications Command. 1966. 362 p. il. Catalog No. D101.11/2:105-50/Chap. 3. $3.75.

Command and Staff Action. Describes Marine Corps staff organization, responsibilities of staff officers, and the procedures of staff functioning followed by a presentation of principles, procedures, and techniques applicable to loading force planning during amphibious operations. 1966. 712 p. il. Catalog No. D214.9/4:3-1. $3.75.

DSA Field Establishment Directory. Reflects each DSA field activity by level designation, mailing address, message address, and telephone number. 1967. 46 p. D7.6/7:5025.2/2. 40¢.



DEFENSE PROCUREMENT

Contracts of $1,000,000 and over awarded during the month of August 1967:

DEFENSE SUPPLY AGENCY

3—**Apparel Corp. of America**, Knoxville, Tenn. $2,257,100. 451,420 coated nylon twill ponchos. Defense Personnel Support Center, Philadelphia, Pa.

—**Owens-Illinois, Inc.**, Toledo, Ohio. $1,092,336. 2,752,830 fiberboard boxes for individual combat meals and inflight food packets. Defense Personnel Support Center, Philadelphia, Pa.

4—**Montgomery Pipe & Tube Co.**, Miami, Fla. $1,672,008. 1,150 barbed tape dispensers, 113,044 rolls of concertina barbed tape, 11,250 cases of barbed tape steel and carrying cases. Defense Construction Supply Center, Columbus, Ohio.

—**Henry Weingartner & Co.**, New York, N.Y. $1,337,822. 14,082,340 lbs. of corrugated, zinc-coated sheet steel. Defense Industrial Supply Center, Philadelphia, Pa.

—**United Fruit & Food Corp.**, Boston, Mass. $1,054,337. 173,394 lbs. of dehydrated shrimp. Defense Personnel Support Center, Philadelphia, Pa.

7—**Shell Oil Co.**, New York, N.Y. $3,658,100. 2,700,000 barrels of number six fuel oil. Defense Fuel Supply Center, Alexandria, Va.

8—**Dale Fashions, Inc.**, Vineland, N.J. $1,505,400. 60,000 polyester/wool men's tropical coats. Defense Personnel Support Center, Philadelphia, Pa.

9—**J. P. Stevens & Co.**, New York, N.Y. $4,891,257. 3,060,000 yards of cotton oxford, wind-resistant cloth. Defense Personnel Center, Philadelphia, Pa.

10—Defense Fuel Supply Center, Alexandria, Va., has awarded the following contracts for aviation gasoline:

Mobil Oil Corp., New York, N.Y. $15,780,257. 96,355,000 gallons of Grade 115/145 and 2,805,100 gallons of grade 80/87.

Humble Oil & Refining Co., Houston, Tex. $11,581,208. 80,506,000 gallons of grade 115/145.

Cities Service Oil Co., New York, N.Y. $6,268,794. 42,000,000 gallons of grade 115/145.

Phillips Petroleum Co., Bartlesville, Okla. $9,214,489. 54,903,000 of grade 115/145 and 15,000 gallons of grade 100/130.

Texaco, Inc., New York, N.Y. $7,160,160. 50,400,000 gallons of grade 115/145.

Shell Oil Co., New York, N.Y. $4,522,441. 28,840,000 gallons of grade 115/145, 902,000 gallons of grade 80/87 and 560,000 gallons of grade 100/130.

American Oil Co., Chicago, Ill. $1,588,068. 10,818,000 gallons of grade 115/145, 25,000 gallons of grade 100/130 and 21,000 gallons of grade 80/87.

Continental Oil Co., Houston, Tex. $1,056,333. 6,746,000 gallons of grade 115/145.

Tidewater Oil Co., New York, N.Y. $1,614,964. 10,500,000 gallons of grade 115/145.

Union Oil Co., Los Angeles, Calif. $2,259,640. 12,600,000 gallons of grade 115/145 and 20,000 gallons of grade 80/87.

CONTRACT LEGEND

Contract information is listed in the following sequence: Date—Company—Value—Material or Work to be Performed—Location of Work Performed (if other than company plant)—Contracting agency.

15—**United Aircraft**, East Hartford, Conn. $1,678,714. 2,819 sets of annular ball bearings. Defense Industrial Supply Center, Philadelphia, Pa.

—**Oregon Freeze Dry Foods**, Albany, Ore. $6,107,771. 6,547,092 food packets for long range patrols. Defense Personnel Support Center, Philadelphia, Pa.

—**Freeze Dry Products**, Evansville, Ind. $2,474,146. 2,182,364 food packets for long range patrols. Defense Personnel Support Center, Philadelphia, Pa.

—**United Fruit and Food Corp.**, Boston, Mass. $1,939,159. 364,010 pounds of fish squares, dehydrated cod or haddock. Defense Personnel Support Center, Philadelphia, Pa.

—**General Foods**, White Plains, N.Y. $1,301,286. 238,120 pounds of fish squares, dehydrated cod or haddock. Defense Personnel Support Center, Philadelphia, Pa.

18—**Riegel Textile Corp.**, New York, N.Y. $2,768,912. 3,328,000 yards of cotton oxford, wind-resistant cloth. Defense Personnel Support Center, Philadelphia, Pa.

—The Defense Fuel Supply Center, Alexandria, Va., has awarded the following contracts for JP-4 jet fuel:

Standard Oil Co. of Calif., San Francisco, Calif. $3,908,205. 32,340,000 gallons.

Suntide Refining Co., Tulsa, Okla. $3,494,400. 33,600,000 gallons.

Coastal States Petrochemical Co., Houston, Tex. $2,506,304. 23,856,000 gallons.

Atlantic Richfield Co., Los Angeles, Calif. $1,013,040. 8,400,000 gallons.

23—**Bibb Mfg. Co.**, Macon, Ga. $1,123,006. 242,550 yards of polymide twill, high temperature resistant cloth. Defense Personnel Support Center, Philadelphia, Pa.

—**Kaiser Steel Corp.**, El Monte, Calif. $27,382,320. 126,000 bundles of steel landing mats. Defense Construction Supply Center, Columbus, Ohio.

—**Putnam Mills Corp.**, New York, N.Y. $1,062,746. 721,000 yards of water resistant cloth. Defense Personnel Support Center, Philadelphia, Pa.

—**J. P. Stevens & Co.**, New York, N.Y. $1,022,434. 700,000 yards of water resistant cloth. Defense Personnel Support Center, Philadelphia, Pa.

—**Plastoid Corp.**, Hamburg, N.J. $2,797,337. 53,282 one-mile reels of telephone cable. Defense Industrial Supply Center, Philadelphia, Pa.

25—**Riegel Textile Corp.**, New York, N.Y. $5,687,475. 2,080,000 yards of cotton sateen cloth (45-inch width) and 9,173,930 yards of cotton sateen cloth (42-inch width). Defense Personnel Support Center, Philadelphia, Pa.

—**Prestex, Inc.**, New York, N.Y. $2,087,908. 2,614,612 yards of cotton sateen cloth (88-inch width). 1,628,172 yards of cotton sateen cloth (42-inch width) and 99,144 yards of cotton sateen cloth (45-inch width). Defense Personnel Support Center, Philadelphia, Pa.

—**J. P. Stevens & Co.**, New York, N.Y. $1,799,967. 3,575,000 yards of cotton sateen cloth (45-inch width). Defense Personnel Support Center, Philadelphia, Pa.

28—**Uniroyal**, Providence, R.I. $1,454,826. 386 ponton floats. Defense Construction Supply Center, Columbus, Ohio.

—**J. P. Stevens & Co.**, New York, N.Y. $1,702,679. 718,000 linear yards of tropical wool and polyester cloth. Defense Personnel Support Center, Philadelphia, Pa.

—**South Jersey Clothing Co.**, Minotola, N.J. $1,464,870. 69,000 men's green wool serge coats with belts. Defense Personnel Support Center, Philadelphia, Pa.

—**Apparel Corp.**, Knoxville, Tenn. $1,425,500. 232,546 men's field coats with hoods. Defense Personnel Support Center, Philadelphia, Pa.

30—**M-R-S Mfg. Co.**, Flora, Miss $1,927,960. Thirty wheeled construction tractors with scrapers. Defense Construction Supply Center, Columbus, Ohio.

31—**Riegel Textile Corp.**, New York, N.Y. $2,657,280. 2,400,000 linear yards of camouflage printed cotton poplin cloth. Defense Personnel Support Center, Philadelphia, Pa.

—The Defense Fuel Supply Center, Alexandria, Va., has awarded the following contracts for petroleum products:

Refineria Panama S.A., New York, N.Y. $2,910,000. 1,500,000 gallons of number six fuel oil.

Gulf Oil Co., Houston, Tex. $2,618,061. 335,300 gallons of diesel fuel and 564,700 gallons of number six fuel oil.

Howard Fuel Corp., Brooklyn, N.Y. $1,366,444. 850,000 gallons of number six fuel oil and 3,000 gallons of diesel oil.

Mobile Oil Corp., New York, N.Y. $1,649,877. 319,000 gallons of number six fuel oil, 244,770 gallons of diesel fuel and 80,000 gallons of gasoline.

DEPARTMENT OF THE ARMY

1—**Cessna Aircraft Co.**, Wichita, Kan. $2,350,000. SUU-7C/A bomb dispensers. Ammunition Procurement & Supply Agency, Joliet, Ill.

2—**American Bosch Arma Corp.**, Springfield, Mass. $1,241,421. Fuel metering pumps for 2½-ton trucks. Tank Automotive Command, Warren, Mich.

—**Bell Aerospace Corp.**, Fort Worth, Tex. $1,633,396. Tail rotor hub assemblies for UH-1 helicopters. Aviation Materiel Command, St. Louis, Mo.

3—**Martin-Marietta**, Orlando, Fla. $5,000,000. Improved Pershing ground support equipment. Army Missile Command, Huntsville, Ala.

—**Lear-Siegler**, Maple Heights, Ohio. $2,903,162. M60, M48 and M103 tank generator assemblies. Tank Automotive Command, Warren, Mich.

—**Polan Industries**, Huntington, W. Va. $2,256,000. Truck mounted mine detecting sets. Mobility Equipment Command, St. Louis, Mo.

—**Bell Aerospace Corp.**, Fort Worth, Tex. $1,000,000. Crash damage repair kits for UH-1 helicopters. Aviation Materiel Command, St. Louis, Mo.

4—**U.S. Steel Corp.**, Pittsburgh, Pa. $6,308,100. Metal parts for 8-inch howitzer projectiles. Berwick, Pa. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Continental Motors**, Muskegon, Mich. $3,855,650. Multi-fuel engines for 2½-ton trucks. Tank Automotive Command, Warren, Mich.

—**Penner Construction Co.**, Denver, Colo. $1,255,270. Construction of a Federal Regional Center Complex at Denver. Engineer Dist., Omaha, Neb.

—**Spencer Construction Co.**, Carrollton, Tex. $1,181,567. Construction of a floodway extension on the Trinity River. Fort Worth, Tex. Engineer Dist., Fort Worth, Tex.

—**D. E. Goodchild, Inc.**, Circleville, Ohio. $1,032,159. Construction of asphalt roads and a 138-foot bridge in connection with the Deer Creek, Ohio, Reservoir Project. Engineer Dist., Huntington, W. Va.

—**U.S. Steel Corp.**, Pittsburgh, Pa. $1,000,000. Reactivation, repair and relocation of Government equipment. Berwick, Pa. Ammunition Procurement & Supply Agency, Joliet, Ill.

7—**Philco-Ford Corp.**, Newport Beach, Calif. $1,786,647. Signal convertors for the Shillelagh missile system. Lawndale, Calif. Southwest Procurement Detachment, Pasadena, Calif.

—**Strick Corp.**, Fairless Hills, Pa. $3,074,103. Twelve-ton semi-trailers. Chicago, Ill. Tank Automotive Command, Warren, Mich.

—Independent Lock Co., Fitchburg, Mass. $2,637,765. Metal parts for ammunition fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Rulon Co., Aurora, Ill. $4,376,058. Metal parts for fuzes. Chicago, Ill. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Lear-Siegler, Inc., Anaheim, Calif. $4,861,034. Metal parts for fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill.

9—FMC Corp., Santa Clara, Calif. $1,875,000. Metal parts for 4.2-inch high explosive projectiles. Northwest Procurement Agency, Oakland, Calif.

—L.S.I. Service Corp., Oklahoma City, Okla. $4,724,379. Personnel services for maintenance of Army aircraft in Vietnam. Aviation Material Command, St. Louis, Mo.

—Dyna Electron Corp., Fort Worth, Tex. $8,312,105. Services of contractor personnel for maintenance of Army aircraft in Vietnam. Aviation Material Command, St. Louis, Mo.

—Chrysler Corp., New Orleans, La. $4,000,000. 175mm projectiles. St. Louis, Mo. Ammunifon Procurement & Supply Agency, Joliet, Ill.

—Ronlee, Inc., Miami Springs, Fla. $2,548,040. Construction work on the Central and Southern Florida Flood Control Project. Engineer Dist., Jacksonville, Fla.

—Peter Kiewit Sons Co., Seattle, Wash. $3,547,400. Construction of a multi-purpose recreation building; an airmen dormitory; a warehouse; an automotive shop; and modifications to existing airmen dormitories. Clear Air Force Station, Alaska. Engineer Dist., Anchorage, Alaska.

—Firestone Tire & Rubber Co., Akron, Ohio. $7,849,565. Track shoe assemblies for M113 armored personnel carriers. Noblesville, Ind. Tank Automotive Command, Warren, Mich.

—J. A. Jones Construction Co., Charlotte, N.C. $2,000,000. Construction of processing facilities at the Army Ammunition Plant, Radford, Va. Engineer Dist., Norfolk, Va.

—Chrysler Corp., New Orleans, La. $15,000,000. 175mm projectiles. St. Louis, Mo. Ammunition Procurement & Supply Agency, Joliet, Ill.

10—General Motors, Kokomo, Ind. $1,103,715. Squad radio sets. Electronics Command, Philadelphia, Pa.

—Chaney & Hope, Inc., Addison, Tex. $1,626,500. Construction of training ranges for basic and advanced infantry training. Fort Dix, N.J. Engineer Dist., New York, N.Y.

—Cook Construction Co., Jackson, Miss. $9,834,632. Construction work on the Melvern Dam & Reservoir Project. Melvern, Kan. Engineer Dist., Kansas City, Mo.

11—Al Johnson Construction Co., Massman Construction Co. and Peter Kiewit Sons' Co., Minneapolis, Minn. $20,926,671. Construction work on the Racine Lock and Dam Project. Meigs County, Ohio, and Mason County, W. Va. Engineer Dist., Huntington, W. Va.

—Remington Arms Co., Bridgeport, Conn. $16,240,267. 7.62mm and 5.56mm cartridges. Independence, Mo. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Federal Cartridge Corp., Minneapolis, Minn. $43,801,904. 5.56mm and 7.62mm cartridges and for operation and maintenance activities at the Twin Cities Army Ammunition Plant, New Brighton, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Fairbanks Morse, Inc., Beloit, Wis. $5,984,644. Manufacture and delivery of 10 vertical flood water pumps for the St. Francis Basin, Mississippi River and tributaries flood control project. Engineer Dist., Memphis, Tenn.

—General Electric, Syracuse, N.Y. $1,904,034. Improvement kits for the Hercules missile system. Army Missile Command, Huntsville, Ala.

—Standard Container Co., Montclair, N.J. $1,865,500. Ammunition box assemblies. Homerville, Ga. Frankford Arsenal, Philadelphia, Pa.

—King Fisher Marine Service, Port Lavaca, Tex. $1,146,400. Construction work on lock and dam number two, Arkansas River Project. Grady, Ark. Engineer Dist., Little Rock, Ark.

—Midvale-Heppenstall Co., Philadelphia, Pa. $1,153,425. Forgings for 175mm guns. Watervliet Arsenal, Watervliet, N.Y.

—Colt's, Inc., Hartford, Conn. $2,087,670. Barrel assemblies for M16 and M16A1. Army Weapons Command, Rock Island, Ill.

—Chamberlain Mfg. Corp., Waterloo, Iowa, $1,183,259. Metal parts for 4.2-inch illuminating projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Lake McDonald, Inc., Vidalia, Ga. $2,841,000. Construction of 180 housing units at Fort Jackson, S.C. Engineer Dist., Savannah, Ga.

14—Martin-Marietta Corp., Orlando, Fla. $2,294,883. Metal parts for aerial mines. Ammunition Procuremnt & Supply Agency, Joliet, Ill.

—Sprague Electric Co., North Adams, Mass. $1,312,500. Integrated circuits for M514Al fuzes. Worcester, Mass. Harry Diamond Laboratories, Washington, D.C.

—Wesinghouse Electric, Elk Ridge, Md. $1,282,500. Integrated circuits for M514A1 fuzes. Harry Diamond Laboratories, Washington, D.C.

15—Franchi Construction Co., Newton, Mass. $6,710,000. Construction of troop housing and supporting facilities at Fort Devens, Mass. New England Division, Army Corps of Engineers, Waltham, Mass.

—American Dredging Co., Philadelphia, Pa. $5,388,000. Dredging about 19 miles of channel on the Arkansas River. Near Dardanelle, Ark. Engineer Dist., Little Rock, Ark.

—Eureka Williams Co., Bloomington, Ill. $4,044,944. Metal parts for 750-lb. bomb nose fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Pace Corp., Memphis, Tenn. $1,968,062. M49Al surface trip flares. Memphis, Tenn.; Camden, Ark.; and Russell, Ark. Picatinny Arsenal, Dover, N.J.

—Continental Motors, Muskegon, Mich. $1,594,908. Multi-fuel engines for five ton trucks. Tank Automotive Command, Warren, Mich.

16—R.C.A., Camden, N.J. $5,992,686. Radio sets and receiver/transmitters. Electronics Command, Philadelphia, Pa.

—Raytheon Co., Lexington, Mass. $4,890,536. Hawk guidance and control component sets. Andover, Mass. Army Missile Command, Huntsville, Ala.

—Emerson Electric Co., St. Louis, Mo. $4,382,620. Line items of repair parts for the XM28 aircraft armament subsystem. Army Weapons Command, Rock Island, Ill.

—General Instrument, Inc., Chicopee, Mass. $2,253,600. Metal parts assemblies for 750-lb. bomb nose fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill.

17—Magnavox Co., Fort Wayne, Ind. $9,360,688. AN/GRC-106 radio sets. Electronics Command, Philadelphia, Pa.

—I.T. & T., Nutley, N.J. $2,421,141. Installation, services and materials for interconnection, testing and alignment of Government-owned ET-A Phase II communication equipment. West Germany. Electronics Command, Fort Monmouth, N.J.

—Amron Corp., Waukesha, Wis. $1,290,000. M103, 20mm brass cartridge cases. Frankford Arsenal, Philadelphia, Pa.

18—Memcor, Inc., Huntington, Ind. $14,115,389. Receiver-transmitter portions of the AN/VRC-12 family of vehicle radio communications sets. Electronics Command, Philadelphia, Pa.

—R. G. LeTourneau, Inc., Longview, Tex. $18,595,500. Metal parts for M117Al, 750-lb. bombs. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Raytheon Co., Lexington, Mass. $3,712,800. M905 fuzes for 750-lb. bombs. Bristol, Tenn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Talley Industries, Mesa, Ariz. $2,333,080. Loading assembly for 4.2-inch projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Stewart-Warner Corp., Lebanon, Ind. $2,062,830. M49A2 60mm mortar projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Airport Machine Co., Martin, Tenn. $1,156,250. M49A2, 60mm mortar projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.

21—Sylvania Electric Products, Mountain View, Calif. $1,000,000. Classified electronic equipment. Electronics Command, Fort Monmouth, N.J.

—General Motors, Detroit, Mich. $4,387,500. 81mm mortar projectiles. Warren, Mich. Ammunition Procurement & Supply Agency, Joliet, Ill.

—E. W. Blair, Inc., Salina, Kan. $1,233,423. Construction work on the Pine Creek Reservoir Project in Oklahoma. Engineer Dist., Tulsa, Okla.

—Allis Chalmers Mfg. Co., Milwaukee, Wis. $5,975,555. Scoop loaders. Deerfield, Ill. Mobility Equipment Command, St. Louis, Mo.

—Chamberlain Mfg. Corp., Waterloo, Iowa. $1,353,260. Metal parts for 4.2-inch illuminating projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Portable Electric Tools, Inc., Geneva, Ill. $1,016,015. Fin assemblies for 81mm illuminating projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Chrysler Corp., Centerline, Mich. $49,152,044. M60Al tanks, trainers, and M728 combat engineer vehicles with concurrent repair parts. Warren, Mich. Tank Automotive Command, Warren, Mich.

—United Aircraft, West Palm Beach, Fla. $3,750,000. Design, fabrication and test of an advanced technology, 1,500 horsepower, aircraft gas turbine demonstrator engine. Aviation Material Laboratories, Fort Eustis, Va.

22—Alcan Aluminum Corp., Riverside, Calif. $1,480,500. Rocket motors for light antitank weapons. Southwest Procurement Agency, Pasadena, Calif.

—Raytheon Co., Andover, Mass. $1,102,500. Refurbishment of Hawk missile launchers. Army Missile Command, Huntsville, Ala.

—Anthony Co., Streator, Ill. $5,577,988. Rough terrain fork lift trucks. Army Mobility Equipment Command, St. Louis, Mo.

23—Teichert & Son, Inc., Sacramento, Calif. $1,234,401. Work on the Sacramento River Bank Flood Protection Project. Engineer Dist., Sacramento, Calif.

—Raytheon Co., Andover, Mass. $7,492,928. Fifteen line items of ground support equipment for the Hawk missile system. Army Missile Command, Huntsville, Ala.

—General Motors, Indianapolis, Ind. $2,823,294. Transmission assemblies for M48 and M60 tanks. Tank-Automotive Command, Warren, Mich.

24—Caterpillar Tractor Co., Peoria, Ill. $2,867,517. Full-tracked tractors. Mobility Equipment Command, St. Louis, Mo.

—Raytheon Co., Andover, Mass. $1,213,405. Rebuilding of sets of guidance and control components for Hawk missile systems. Army Missile Command, Huntsville, Ala.

—Boeing Co., Morton, Pa. $1,734,050. Modification kits for CH-47 helicopters. Aviation Materiel Command, St. Louis, Mo.

—Raytheon Co., Bedford, Mass. $1,270,463. Facilities for the manufacture of anti-intrusion warning mines. $3,648,057. Classified amount of anti-intrustion warning mines. Quincy, Mass. Picatinny Arsenal, Dover, N.J.

—Sylvania Electronics Systems, Williamsville, N.Y. $4,862,568. Classified amount of anti-intrusion warning mines. Buffalo, N.Y. Pictinny Arsenal, Dover, N.J.

—American Cystoscope Makers, Pelham Manor, N.Y. $2,141,532. Telescopes with mounts and spare parts. Bronx, N.Y. Frankford Arsenal, Philadelphia, Pa.

—Mack Corp., Allentown, Pa. $1,748,560. Eleven line items for the ten-ton truck. Tank Automotive Command, Warren, Mich.

25—Sperry Rand Corp., New York, N.Y. $37,068,642. Manufacturing, assembling, loading and packing of large caliber projectiles. Shreveport, La. Ammunition Procurement & Supply Agency, Joliet, Ill.

—General Motors, Detroit, Mich. $3,150,620. Diesel engines for M113 vehicles. Tank Automotive Command, Warren, Mich.

—Timmons, Butt & Head, Inc., Dayton, Ohio. $2,837,775. Construction of additions and alterations to a composite medical facility at Wright-Patterson AFB, Ohio. Engineer Dist., Louisville, Ky.

28—Olin Mathieson Chemical Corp., East Alton, Ill. 24,452,226. Oil and artillery ammunition propellant. Baraboo, Wis. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Atlas Chemical Industries, Wilmington, Del. $20,275,890. Manufacture of TNT. Chattanooga, Tenn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Raytheon Co., Lexington, Mass. $1,968,800. Metal part for 750-lb. bomb nose fuzes. Bristol, Tenn. Ammuniton Procurement & Supply Agency, Joliet, Ill.

—Farmers Chemical Association, Tyner, Tenn. $2,415,186. Manufacture of TNT. Chattanooga, Tenn. Ammuntion Procurement & Supply Agency, Joliet, Ill.

—Union Carbide Corp., New York, N.Y. $3,269,117. BA-386/PRC-25 dry batteries for AN/PRC-25 radio sets. Greenville and Charlotte, N.C. $3,194,382. BA-279/U dry batteries for AN/PRC 8, 9 and 10 radio

sets. Charlotte, N.C. Electronics Command, Philadelphia, Pa.

—**Servell, Inc.**, Freeport, Ill. $1,198,500, BA-279/U dry batteries for AN/PRC-8, 9 and 10 radio sets. Electronics Command, Philadelphia, Pa.

—**Bucyrus Erie Co.**, Evansville, Ind. $4,-773,600. Cranes. Erie, Pa. Mobility Equipment Command, St. Louis, Mo.

9—**Kennedy Van Saun**, Danville, Pa. $1,165,-650. 60mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Kaiser Aluminum & Chemical Sales**, Erie, Pa. $1,269,625. Fin assemblies for 81mm mortars. Ammunition Procurement & Supply Agency, Joliet, Ill.

1—**Union Carbide Corp.**, Bennington, Vt. $1,986,000. M514 artillery fuze component. Harry Diamond Laboratories, Washington, D.C.

—**Page Aircraft Maintenance, Inc.**, Fort Rucker, Ala. $17,100,000. Maintenance of aircraft for a nine month period. Aviation Center, Fort Ruker, Ala.

—**Mason & Hanger, Silas Mason Co.**, Lexington, Ky. $22,235,724. Loading, assembling and packing ordnance items. Grand Island, Neb. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Norris Industries**, Los Angeles, Calif. $5,694,770. 105mm cartridge cases. Riverbank, Calif. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Temco, Inc.**, Nashville, Tenn. $1,411,410. Metal part for 106mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Plymouth Plastics Division of AMETEK, Inc.**, Sheboygen, Wis. $1,656,000. Support assemblies for fiber ammunition containers. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Fusion Rubbermaid Corp.**, Statesville, N.C. $1,835,044. Plastic canisters for tactical fighter dispensing munitions program. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Baldwin Electronics**, Little Rock, Ark. $2,-074,247. Fuze and switch assemblies for the tactical fighter dispensing system. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Atlantic Research Corp.**, West Hanover, Mass. $1,137,902. Explosives. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Batesville Mfg. Co.**, Batesville, Ark. $1,-278,328. 750-lb. bomb nose fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Olin Mathieson Chemical Corp.**, New York, N.Y. $3,592,644. Miscellaneous propellants. Charlestown, Ind. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Olin Mathieson Chemical Corp.**, East Alton, Ill. $8,940,458. 81mm illuminating projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Bell & Howell Co.**, Chicago, Ill. $5,614,-565. Metal parts for time fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Unidynamics**, Phoenix, Ariz. $3,274,944. 81mm illuminating projectiles. Goodyear, Ariz. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Chamberlain Mfg. Corp.**, Waterloo, Iowa. $2,677,375. 105mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Amron Corp.**, Waukesha, Wis. $3,124,518. Classified components for 155mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**AVCO Corp.**, Richmond, Ind. $2,688,716. Classified components for 155mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**General Motors**, Indianapolis, Ind. $3,605,-250. Transmissions for M60 tanks. Tank Automotive Command, Warren, Mich.

—**Continental Motors**, Muskegon, Mich. $5,-909,162. Engine assemblies for M60 tanks. $1,203,727. Various line items for rebuilding 5-ton truck engines. Tank Automotive Command, Warren, Mich.

—**Chrysler Corp.**, Warren, Mich. $1,110,759. M601 trucks. Tank Automotive Command, Warren, Mich.

—**FMC Corp.**, Charleston, W. Va. $23,188,-000. Armored personnel carriers and cargo carriers. Tank Automotive Command, Warren, Mich.

—**Texas Instrument, Inc.**, Dallas, Tex. $35,-000,000. Classified electronics equipment. Electronics Command, Fort Monmouth, N.J.

—**ITT Corp.**, Nutley, N.J. $1,888,876. Repair parts for communication systems equipment. Electronics Command, Fort Monmouth, N.J.

—**Stelma, Inc.**, Stamford, Conn. $1,110,984. Terminal telephones. Electronics Command, Philadelphia, Pa.

—**Roberts Corp.**, Albuquerque, N.M. $1,-545,428. Construction of a maintenance hanger, a pump house with utilities, pavements and a storage tank at Holloman AFB, N.M. Engineer Dist., Albuquerque, N.M.

—**Northrop Corp.**, Anaheim, Calif. $3,376,-640. Hawk launchers. Army Missile Command, Huntsville, Ala.

—**Raytheon Co.**, Bedford, Mass. $5,000,000. Advance development of SAM-D missiles. Army Missile Command, Huntsville, Ala.

DEPARTMENT OF THE NAVY

1—**Magnavox Co.**, Fort Wayne, Ind. $1,396,-106. A command active sonobuoy system for use with the A-NEW system. Naval Air Development Center, Johnsville, Pa.

—**Honeywell, Inc.**, St. Petersburg, Fla. $1,-528,205. Repair of Polaris MK 11 Mod O 16 Pendulous Integrating Gyro Accelerometers. Special Project Office.

2—**Sanders Associates**, Nashua, N.H. $1,995,-000. A passive analyzer system for project A-NEW. Naval Air Development Center, Johnsville, Pa.

—**Brewer Drydock Co.**, Staten Island, N.Y. $1,224,000. Activation of the destroyer escort USS Booth (DE-170). Supervisor of Shipbuilding, Fourth Naval Dist., Philadelphia, Pa.

—**Litton Systems**, Woodland Mills, Calif. $1,150,787. Circuit assemblies, amplifiers and logic assemblies for A6A aircraft special support equipment. Navy Aviation Supply Office, Philadelphia, Pa.

3—**General Dynamics**, Pomona, Calif. $12,-644,376. Standard Army missiles. Naval Air Systems Command.

—**Vitro Corp. of America**, Silver Spring, Md. $11,674,916. Fleet Ballistic Missile Program Weapon System engineering. Special Profects Office.

—**Reed & Martin, Inc.**, Honolulu, Hawaii. $11,268,209. Construction of 300 Navy family housing units at Camp Catlin, Oahu, Hawaii, and 250 Air Force family housing units at Wheeler AFB, Hawaii. Pacific Div., Naval Facilities Engineering Command, Pearl Harbor, Hawaii.

—**Grumman Aircraft Engineering Corp.**, Bethpage, N.Y. $6,500,000. Research and development on EA-6B aircraft. Naval Air Systems Command.

4—**Northrop Corp.**, Newbury Park, Calif. $4,-000,000. Design, development, fabrication, test and furnishing of an overall mobile ASW target system. Naval Ordnance Systems Command.

—**LTV Aerospace Corp.**, Dallas, Tex. $5,-500,000. A-7D aircraft. Naval Air Systems Command.

—**Tracer, Inc.**, Austin, Tex. $3,352,700. Technical services and engineering assistance on submarine sonar equipment. Naval Ship Systems Command.

—**Gilbane Building Co.**, Providence, R.I. $2,283,030. Construction of a technical training building at the Officers Candidate School, Newport, R.I. Northeast Div., Naval Facilities Engineering Command, Boston, Mass.

—**Allen M. Campbell Co.**, Tyler, Tex. $1,-522,000. Construction of an aircraft maintenance hanger at the Marine Corps Air Facility, New River, N.C. Atlantic Div., Naval Facilities Engineering Command, Norfolk, Va.

—**Litton Systems**, Woodland Hills, Calif. $1,220,224. Logic card relay modules for special support equipment for A6A aircraft. Navy Aviation Supply Office, Philadelphia, Pa.

—**Teledyne Systems Co.**, Hawthorne, Calif. $1,000,000. Self contained navigation systems. Naval Air Systems Command.

7—**North American Aviation**, Anaheim, Calif. $4,306,361. Repair and modification of Ships Inertial Navigation System (SINS) modules. $3,420,392. Repair and modification of SINS gyroscopes and velocity meters. Naval Ship Systems Command.

—**American Mfg. Co. of Tex.**, Fort Worth, Tex. $1,131,000. Acquisition and installation of facility items and handling equipment. Naval Air Systems Command.

—**Monsanto Research Corp.**, St. Louis, Mo. $1,000,000. Research on high performance composite materials. Office of Naval Research, Washington, D.C.

8—**Philco-Ford Corp.**, Philadelphia, Pa. $2,-204,226. Engineering, furnishing and installing microwave systems at Londonderry, Ireland; San Francisco, Calif.; and Hawaii. Naval Electronics Systems Command.

—**United Aircraft**, East Hartford, Conn. $1,662,793. Repair parts for J-52P8A engines used on A-4F and A-6A aircraft. Navy Aviation Supply Office, Philadelphia, Pa.

—**Curtiss Wright Corp.**, Wood-Ridge, N.J. $1,676,340. Parts to support power plant modifications on J65 engines used on A-4A/B and C aircraft. Navy Aviation Supply Office, Philadelphia, Pa.

9—**Teledyne Systems Co.**, Hawthorne, Calif. $7,406,350. Self-contained navigation systems. Naval Air Systems Command.

—**General Dynamics**, Pomona, Calif. $1,-308,095. Standard Arm missile checkout equipment. $5,003,000. Research and development on the Standarad Arm missile. Naval Air Systems Command.

—**Boeing Co.**, Morton, Pa. $3,110,702. CH-46 helicopters. Naval Air Systems Command.

—**Motorola, Inc.**, Scottsdale, Ariz. $2,110,-761. Guidance and control groups for Sidewinder 1C guided missiles. Naval Air Systems Command.

—**Alsco, Inc.**, St. Louis, Mo. $1,008,575. Rocket launcher components. Naval Air Systems Command.

—**Royal Industries**, Santa Ana, Calif. $1,-907,351. 600-gallon, external fuel tanks. Alhambra, Calif. Naval Air Systems Command.

10—**General Electric**, Schenectady, N.Y. $23,-072,690. Nuclear propulsion research and development. Naval Ship Systems Command.

—**Lockheed Aircraft**, Sunnyvale, Calif. $4,-102,000. Repair and logistic services for Polaris missiles. Special Projects Office.

—**Sangamo Electric Co.**, Springfield, Ill. $1,429,900. Sonar sets for use on naval ships. Naval Ship Systems Command.

11—**Genge Industries, Inc.**, Oxnard, Calif. $1,-720,686. Facilities, materials and services required in the preparation of data used in the overhaul, alteration and repair of ships at Pearl Harbor Naval Shipyard. Naval Supply Center, Pearl Harbor, Hawaii.

14—**Hazeltine Corp.**, Little Neck, N.Y. $6,-186,950. Airborne interrogator sets and related support equipment. Naval Air Systems Command.

—**General Instrument Corp.**, Chicopee, Mass. $5,680,000. Snakeye M900 bomb fuzes. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**F. D. Rich Co.**, Stamford, Conn. $3,224,-000. Construction of 200 housing units at the Quonset Point, R.I., Naval Air Station. Northeast Div., Naval Facilities Engineering Command, Boston, Mass.

—**General Dynamics**, Pomona, Calif. $1,-000,000. FY 1968 installment funding for research and development of the Standard Missile Type I. Naval Ordnance Systems Command.

15—**Boeing Co.**, Morton, Pa. $3,076,000. CH-46 helicopters. Naval Air Systems Command.

—**Westinghouse Electric**, Baltimore, Md. $1,451,689. Development effort related to the Fleet Ballistic Missile weapon system. Special Project Office.

16—**Cameron Iron Works**, Houston, Tex. $1,-783,130. Mark 30, Mod 2 rocket motors and Mark 2, Mod 1 guided missile boosters for the Terrier missile. Naval Ordnance Station, Indian Head, Md.

—**Harnischfeger Corp.**, Milwaukee, Wis. $1,000,000. Truck mounted cranes. Escanaba, Mich. Hqtrs, Marine Corps.

17—**May Aluminum, Inc.**, El Campo, Tex. $3,-698,051. Aluminum air field pallets and mat assemblies for use in landing aircraft. Naval Air Engineering Center, Philadelphia, Pa.

18—**Grumman Aircraft Engineering Corp.**, Bethpage, N.Y. $2,150,000. Classified work on Navy aircraft. Naval Air Systems Command.

21—**U.S. Steel Corp.**, Pittsburgh, Pa. $33,-867,918. Mark 82 bomb bodies. McKeesport, Pa. Navy Ships Parts Control Center, Mechanicsbug, Pa.

—**American Machine & Foundry Co.**, York, Pa. $11,214,000. Mark 82 bomb bodies. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**Intercontinental Mfg. Co.**, Garland, Tex. $7,392,000. Mark 82 bomb bodies. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**Allen M. Campbell Co.**, Tyler, Tex. $6,-602,654. Construction of a helicopter group training facility at the Marine Corps Air Facility, Jacksonville, N.C. Naval Facilities Engineering Command.

—**Sparton Corp.**, Jackson, Mich. $2,992,489. Sonobuoys. Naval Air Systems Command.

22—**General Dynamics**, Pomona, Calif. $12,-715,000. Research and development work on the Standard ARM missile. Naval Air Systems Command.

23—**United Aircraft**, Stratford, Conn. $17,-800,000. Production of CH-53A helicopters. Naval Air Systems Command.

—**Magnavox Co.**, Fort Wayne, Ind. $5,349,-136. FY 1968 procurement of sonobuoys. Naval Air Systems Command.

—**Motorola**, Chicago, Ill. $1,680,167. FY 1968 procurement of bathythermograph transmitter sets. Naval Air Systems Command.

24—**Allen M. Campbell Co.**, Tyler, Tex. $2,-620,000. Construction of a composite medical facility at the Naval Air Station, Albany, Ga. Naval Facilities Engineering Command.

—**Willamette Iron & Steel Co.**, Richmond, Calif. $1,122,252. Drydocking and repair of the attack cargo ship USS Merrick AKA-97). Supervisor of Shipbuilding, Twelfth Naval Dist., San Francisco, Calif.

25—**Garrett Corp.**, Phoenix, Ariz. $2,700,000. Services and materials necessary to perform a product improvement program on YT76-6/8 and T76-G-10/12 engines for OV-10A aircraft. Naval Air Systems Command.

28—**Sperry Rand Corp.**, Syosset, N.Y. $3,360,-000. Inertial navigation subsystem components for Fleet Ballistic Missile submarines. Naval Ship Systems Command.

—**United Aircraft**, East Hartford, Conn. $2,593,147. A-4E and A-6A aircraft engine modification kits. Aviation Supply Office, Philadelphia, Pa.

—**Yuba Industries**, Benicia, Calif. $2,385,-112. Catapult track cover assemblies for aircraft carriers. Naval Supply Center, Oakland, Calif.

—**Lansdowne Steel & Iron Co.**, Morton, Pa. $1,413,871. Mark 52 projectiles. Navy Ships Parts Control Center, Mechanicsburg, Pa.

29—**Grumman Aircraft Engineering Corp.**, Bethpage, N.Y. $3,000,000. Initial design for an improved search radar, a new digital computer system, and a weapons release system in the A-6A aircraft. Naval Air Systems Command.

—**United Aircraft**, East Hartford, Conn. $1,613,913. Engine spare parts used to support the TF30P6 engine on A-7A aircraft. Aviation Supply Office, Philadelphia, Pa.

30—**North American Aviation**, Columbus, Ohio. $50,000,000. FY 1968 incremental funding of Phase II engineering development of Condor missiles. Naval Air Systems Command.

—**F. D. Rich Co.**, Stamford, Conn. $3,379,-000. Construction of 212 housing units at Naval Air Station, Key West, Fla. Southeast Div., Naval Facilities Engineering Command, Charleston, S.C.

—**Westinghouse Electric**, Baltimore, Md. $2,-011,049. Support items and programs for APG-59/60/61 radar sets. Naval Air Systems Command.

—**United Aircraft**, Stratford, Conn. $1,-200,000. Long lead time effort for HH-3E helicopters for the Air Force. Naval Air Systems Command.

31—**McDonnell-Douglas Corp.**, St. Louis, Mo. $38,749,679. F-4 aircraft. Naval Air Systems Command.

—**Goodyear Aerospace Corp.**, Akron, Ohio. $4,601,250. Production of SUBROC missiles and related equipment. Naval Ordnance Systems Command.

—**Hawaiian Dredging & Construction Co.**, Honolulu, Hawaii. $1,784,300. Reconstruction of Berth B-8 at the Naval Shipyard, Pearl Harbor. Naval Facilities Engineering Command.

—**United Aircraft Corp.** $1,707,775. Spare parts to support the TF30-P-12 engine for F111B aircraft. Naval Supply Systems Command.

DEPARTMENT OF THE AIR FORCE

1—**Serv-Air Inc.**, Enid, Okla. $8,095,287. Base support services for FY 1968 at Vance AFB, Okla. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

—**Westinghouse Electric**, Baltimore, Md. $2,567,550. Production of airborne communications equipment. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass.

—**Bendix Corp.**, Teterboro, N.J. $3,636,600. Modification of airborne computers. Wilkes-Barre, Pa. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

3—**Northrop Corp.**, Hawthorne, Calif. $2,-715,160. Manufacture and assembly of F-5A and F-5B aircraft and related supplies. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Bendix Corp.**, Teterboro, N.J. $2,364,398. Manufacture of components for airborne navigational equipment. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

4—**Hughes Aircraft**, Culver City, Calif. $6,-557,518. Conversion of AIM 4-C aircraft missiles to AIM 4-D. Tucson, Ariz. Warner Robins Air Materiel Area, (AFLC), Robbins AFB, Ga.

—**Goodyear Aerospace Corp.**, Akron, Ohio. $5,244,000. Cargo handling pallets. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—**Hayes International Corp.**, Birmingham, Ala. $4,537,974. Training sets for the Minuteman missile system. Space and Missile Systems Organization, (AFSC), Los Angeles, Calif.

—**Serv-Air, Inc.**, Enid, Okla. $2,789,699. Services in support of the pilot training program at Sheppard AFB, Tex. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

—**North American Aviation**, Anaheim, Calif. $2,200,000. Maintenance, repair, overhaul and modification of Minuteman guidance and control systems. Space and Missile Systems Organization, (AFSC), Los Angeles, Calif.

—**Cornell Aeronautical Laboratory**, Buffalo, N.Y. $1,400,000. Development, design, and fabrication of a variable stability aircraft. Systems Engineering Group, Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

7—**Menasco Mfg. Co.**, Burbank, Calif. $1,-735,586. Manufacture of landing gear components for C-130 aircraft. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

8—**Greenhut Construction Co.**, Pensacola, Fla. $4,840,821. Construction of 300 family housing units at Eglin AFB, Fla. Air Proving Ground Center, Eglin AFB, Fla.

—**Atlantic Research Corp.**, Alexandria, Va. $3,324,783. Manufacture of meteorological rockets and components. Gainesville, Va. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

9—**Textron, Inc.**, Belmont, Calif. $1,440,495. Spare parts for airborne electronics equipment. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Stelma, Inc.**, Stamford, Conn. $2,775,693. Portable communication components for tactical air control systems. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass.

10—**General Electric**, Syracuse, N.Y. $1,000,-000. Test operations and related tasks in support of various Air Force and NASA programs. Space and Missile Systems Organization, (AFSC), Los Angeles, Calif.

—**Martin-Marietta**, Denver, Colo. $5,534,000. Design, development and fabrication of Titan IIIC space boosters and associated aerospace ground equipment. Space a Missile Systems Organization, (AFSC Los Angeles, Calif.

—**General Electric**, Evendale, Ohio. $2,50 000. Developmental work on a lift cru engine. Aeronautical Systems Di (AFSC), Wright-Patterson AFB, Ohio.

11—**Ralph M. Parsons Co.**, Los Angeles, Cal $1,043,161. Engineering and support ser ices for Minuteman site activation a alteration activities. Space and Miss Systems Organization, (AFSC), L Angeles, Calif.

—**Hughes Aircraft**, Canoga Park, Calif. $ 450,000. Work on an air/ground miss program. Aeronautical Systems Di (AFSC), Wright-Patterson AFB, Ohio.

—**Applied Technology, Inc.**, Sunnyva Calif. $2,148,340. Production of airbor electronic equipment for A-7B aircra for the Navy. Warner Robins Air M teriel Area, (AFLC), Robins AFB, G

—**North American Aviation**, Columbus, Ohi $1,450,000. Work on an air/ground mi sile program. Aeronautical Systems Di (AFSC), Wright-Patterson AFB, Ohic

—**Stromberg-Carlson Corp.**, Rochester, N. $1,204,758. Procurement of central tel phone office equipment. Oklahoma Ci Air Materiel Area, (AFLC), Tinker AF Okla.

—**Marwais Steel Co.**, Richmond, Calif. $ 138,803. Procurement of aircraft reve ments. 2750th Air Base Wing, Wrigh Patterson AFB, Ohio.

14—**Wall Colmonoy Corp.**, San Antonio, Te $2,425,179. Repair of jet engine combu tion chambers. San Antonio Air Materi Area, (AFLC), Kelly AFB, Tex.

—**Continental Aviation & Engineering Cor** Detroit, Mich. $1,289,572. Production J-69 engines for T-37 aircraft. Toled Ohio. Aeronautical Systems Div., (AFSC Wright-Patterson AFB, Ohio.

15—**Electronic Communications, Inc.**, S Petersburg, Fla. $1,699,326. Productio of components for airborne electronic sy tems. Warner-Robins Air Materiel Are (AFLC), Robins AFB, Ga.

—**International Telephone & Telegra Corp.**, Nutley, N.J. $1,522,850. Produ tion of spare parts for airborne electron systems. Warner-Robins Air Materi Area, (AFLC), Robins AFB, Ga.

—**Collins Radio Co.**, Dallas, Tex. $1,164,89 Manufacture of high frequency single si band consoles. Richardson, Tex. Okl homa City Air Materiel Area, (AFLC Tinker AFB, Okla.

16—**United Aircraft**, East Hartford, Con $2,500,000. Developmental work on a li cruise engine. Aeronautical Systems Di (AFSC), Wright-Patterson AFB, Ohio.

—**The Canadian Commercial Corp.** has be awarded three contracts under the U.S Defense Production/Development Shari Program. Work will be performed und sub-contracts as follows:

United Aircraft of Canada, Lt Longueill, Quebec. $1,399,811. Spa parts for R-2000 aircraft engines. S Antonio Air Materiel Area, (AFLC Kelly AFB, Tex.

United Aircraft of Canada, Lt Longueill, Quebec. $1,046,539. Spa parts for R-4360 aircraft engines. S Antonio Air Materiel Area, (AFLC Kelly AFB, Tex.

Litton Systems (Canada), Ltd., Rexdal Ontario. $1,134,774. Weapons relea system AN/ASQ-91 for F-4 aircra Aeronautical Systems Div., (AFSC Wright-Patterson AFB, Ohio. (Issu on Aug. 23).

17—**LTV Electrosystems, Inc.**, Greenville, Te $2,343,621. Inspection and repair of C-1 aircraft. Warner-Robins Air Materi Area, (AFLC), Robins AFB, Ga.

—**Hayes International Corp.**, Birmingha Ala. $3,335,938. Inspection and repa of C-130 aircraft. Warner-Robins A Materiel Area, (AFLC), Robins AFB, G

—**Fairchild-Hiller Corp.**, St. Augustine, Fl $2,294,428. Inspection and repair of C-1 aircraft. St. Petersburg, Fla. Warne Robins Air Materiel Area, (AFLC), Robi AFB, Ga.

—**LTV Electrosystems, Inc.**, Greenville, Te $1,323,426. Inspection and repair of 133 aircraft. Warner-Robins Air Materi Area, (AFLC), Robins AFB, Ga.

18—**Western Electric Co.**, New York, N. $1,604,700. Missile borne guidance equipment. Burlington, N.C. Space & Missle Systems Organization, (AFSC), Los Angeles, Calif.

—**Bendix Corp.**, Teterboro, N.J. $1,453,788. Repair and modification of airborne computer components. Wilkes Barre, Pa. and

Teterboro. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

Weber Aircraft Co., Burbank, Calif. $1,063,788. Production of components to modify the F-105 crew escape system. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

1 **Bendix Corp.**, Teterboro, N.J. $1,011,000. Manufacture of navigational computer sets for C-141 aircraft. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

Boeing Co., Wichita, Kan. $3,400,852. B-52 field modification services, Barksdale AFB, La.; Castle AFB, Calif.; and Westover AFB, Mass. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

Sanders Associates, Inc., Nashua, N.H. $2,263,706. Production of airborne radio direction finding equipment. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

Lockheed Missiles & Space Co., Sunnyvale, Calif. $1,113,000. Maintenance and support testing of the AGENA program, Santa Cruz, Calif. Space and Missile Systems Organization, (AFSC), Los Angeles, Calif.

2 **Stewart Warner Corp.**, Chicago, Ill. $1,256,427. Manufacture of components for airborne radar altimeters. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

North American Aviation, Anaheim, Calif. $2,017,131. Development, fabrication and test of a laser subsystem. Air Proving Ground Center, Eglin AFB, Fla.

3 **Bendix Corp.**, Teterboro, N.J. $1,356,936. Manufacture of components for airborne navigational sets. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

North American Aviation, Tulsa, Okla. $4,162,671. Inspection and repair of air-ground missiles, Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

Fairchild Hiller Corp., Farmingdale, N.Y. $2,341,760. Manufacture of fuel modification kits for F-105 aircraft. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

4 **Martin-Marietta**, Baltimore, Md. $1,116,834. Modification of KC-135 aircraft. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

8 **Aero Corp.**, Lake City, Fla. $3,047,847. Inspection and repair of C-124 aircraft. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

Curtiss-Wright Corp., Wood-Ridge, N.J. $1,030,400. Overhaul of J-57 aircraft engines. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

9 **Aerodex, Inc.**, Miami, Fla. $3,080,951. Overhaul of J-57 aircraft engine components. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

Sylvania Electric Products, Needham Heights, Mass. $1,300,505. Fabrication of a launch control facility. Space & Missile Systems Organization, (AFSC), Los Angeles, Calif.

Aerojet-General Corp., Sacramento, Calif. $1,530,122. Overhaul test and service life analytical program services in support of Titan II propulsion engine systems. Ogden Air Materiel Area, (AFSC), Hill AFB, Utah.

North American Aviation, Anaheim, Calif. $3,824,478. Overhaul and repair of air-to-ground missiles. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

0 **Boeing Co.**, Seattle, Wash. $1,524,483. Production of Minuteman missiles and related equipment. Space and Missile Systems Organization, (AFSC), Los Angeles, Calif.

General Dynamics, San Diego, Calif. $1,000,000. Services in support of the ballistic vehicle re-entry system. Space and Missile Systems Organization, (AFSC), Los Angeles, Calif.

1 **Electro-Optical Systems, Inc.**, Pasadena, Calif. $1,218,700. Research and development on an ion engine system. Systems Engineering Group, (AFSC), Aeronautical Systems Div., Wright-Patterson AFB, Ohio.

Systems Development Corp., Santa Monica, Calif. $4,385,000. Computer programming services for the air defense system. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass.

Fairchild Hiller Corp., Farmingdale, N.Y. $6,341,620. Manufacture of fuel tank modification kits for F-105 aircraft. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

AVCO Corp., Wilmington, Mass. $3,500,060. Design, development and fabrication, test and evaluation of the Minuteman IIA re-entry vehicle. Space and Missile Systems Organization, (AFSC), Los Angeles, Calif.

McDonnell-Douglas, Santa Monica, Calif. $28,700,000. C-9A aeromedical evacuation aircraft. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

OFF-SHORE PROCUREMENT

10—**Shipping & Coal Co.**, Rotterdam, The Netherlands. $23,106,592 and $1,827,152. Coal. Army Procurement Center, Frankfurt, Germany.

Defense Supply Agency Activities Continue Upswing

The Defense Supply Agency (DSA) continues to show increases in most categories of its activities as logistic support of the Military Services reflects the heightened tempo of activities in Southeast Asia during FY 1967.

In procurement, the FY 1967 total amounted to $6.2 billion, a substantial gain over the $5.7 billion of the previous year and more than double the amount of money spent two years ago.

In its first full year of operations, the Defense Contract Administration Services, a major activity of DSA providing unified administration of contracts for supplies and services to the military and various Federal and state agencies, had more than 270,000 prime and secondary contracts valued at $49 billion assigned for full administration.

Procurement Totals for Defense Supply Agency Centers

Activity	FY 1967 (Millions of dollars)	FY 1966 (Millions of dollars)
Defense Construction Supply Center	670.3	679.1
Defense Electronics Supply Center	280.7	224.1
Defense Fuel Supply Center	1,504.3	1,302.7
Defense General Supply Center	731.7	532.2
Defense Industrial Supply Center	360.4	326.8
Defense Personnel Support Center		
Clothing	1,119.5	1,176.6
Medical	205.5	230.1
Subsistence	1,280.3	1,232.6

Vice Adm. Lyle Now President of NSIA

Vice Admiral Joseph M. Lyle, USN (Ret.), former Director of the Defense Supply Agency, became President of the National Security Industrial Association (NSIA) Sept. 28 upon the retirement of the incumbent, Captain Robert N. McFarlane, USN (Ret.).

Admiral Lyle has been serving as Vice President for Operations of NSIA since July 1 when he retired from the U.S. Navy.

A native of Augusta, Ga., Admiral Lyle graduated from the U.S. Naval Academy in 1935.

In 1962 he was appointed Deputy Director of the newly established Defense Supply Agency. He remained in that position until 1964 when he became the agency's Director with three-star rank.

AFMA Re-elects Gen. Bunker President

Lieutenant General William B. Bunker, Deputy Commanding General, Army Materiel Command, has been elected to a second term as National President and Chairman of the Board of the Armed Forces Management Association.

Members of the Board re-elected as directors for the 1967–69 term were: Edmund D. Dwyer, Assistant Commissioner, Federal Supply Service, General Services Administration; Honorable Solis Horwitz, Assistant Secretary of Defense (Administration); Rawlings S. Poole, Office of the Assistant Secretary of Defense (Comptroller); John F. Snyder, Office of the Assistant Secretary of Defense (Comptroller); and Hugh E. Witt, Deputy Assistant Secretary of the Air Force.

OFFICE OF THE SECRETARY OF DEFENSE
WASHINGTON, D. C. 20301

OFFICIAL BUSINESS

POSTAGE AND FEES PAID

Navy and Commerce Departments Agree on Surface-Effect Ship Plan

The Navy and Department of Commerce have agreed upon a master plan for future development of large, fast, surface-effect ships.

The surface-effect principle offers a potential for greatly improving the speed and efficiency of military and commercial ships. Such vessels utilize a "cushion" or "bubble' of pressurized air to support their weight. Exploitation of this basic principle may make possible a class of high-speed ships capable of speeds three to five times that of the conventional vessels.

An integral part of determining the feasibility of building and operating the large vessels is the design of a small surface-effect ship for test purposes. As a preliminary step in this direction, a fixed-price contract of $125,000 to Aerojet General Corp., El Monte, Calif., has been awarded by the Joint Surface Effect Ship Program Office, located at the Naval Research and Development Center, Carderock, Md.

Similar contracts are also being negotiated with Bell Aerosystems Co., Buffalo, N.Y., and General Dynamics, Electric Boat Division, Groton, Conn., for conceptual and parametric design studies for a high speed surface-effect ship test craft of less than 100 gross tons.

The three contractors are to submit their studies within five months. If the results are promising, a contract for an experimental vessel will probably be awarded.

The master development plan amplifies a joint agreement signed by the two departments in June 1966, establishing a cooperative research program to determine the feasibility of building and operating large, fast, surface-effect ships weighing 4,000 to 5,000 tons and capable of speeds of more than 80 knots.

Objective of the program is to advance the state of technology of surface-effect ships to a point where design parameters and technological problems can be predicted, identified and measured with reasonable confidence. The engineering and technical framework will thus be laid for later and independent development of naval and commercial ships.

Annual Competition for Coast Guard Academy Appointments Set

Annual nationwide competition for appointment to the U.S. Coast Guard Academy will begin with the Dec. 2, 1967, administration of the College Entrance Examination Board Tests.

Appointment to the academy is obtained by competitive examination only; there are no congressional appointments or state quotas. The four-year curriculum leads to a Bachelor of Science degree and commission as ensign in the Coast Guard.

The examination is open to unmarried men, military or civilian, who will have reached their 17th but not their 22nd birthday on July 1, 1968. Applicants must be in good physical condition, and be interested in a career as an officer in the Coast Guard.

Requests for information concerning the examination and the requirements should be addressed to the Director of Admissions, U.S. Coast Guard Academy, New London, Conn. 06320.

All applications should be postmarked not later than Dec. 15, 1967. Arrangements to participate in the examination should be completed by Oct. 28, 1967.

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DEFENSE INDUSTRY BULLETIN

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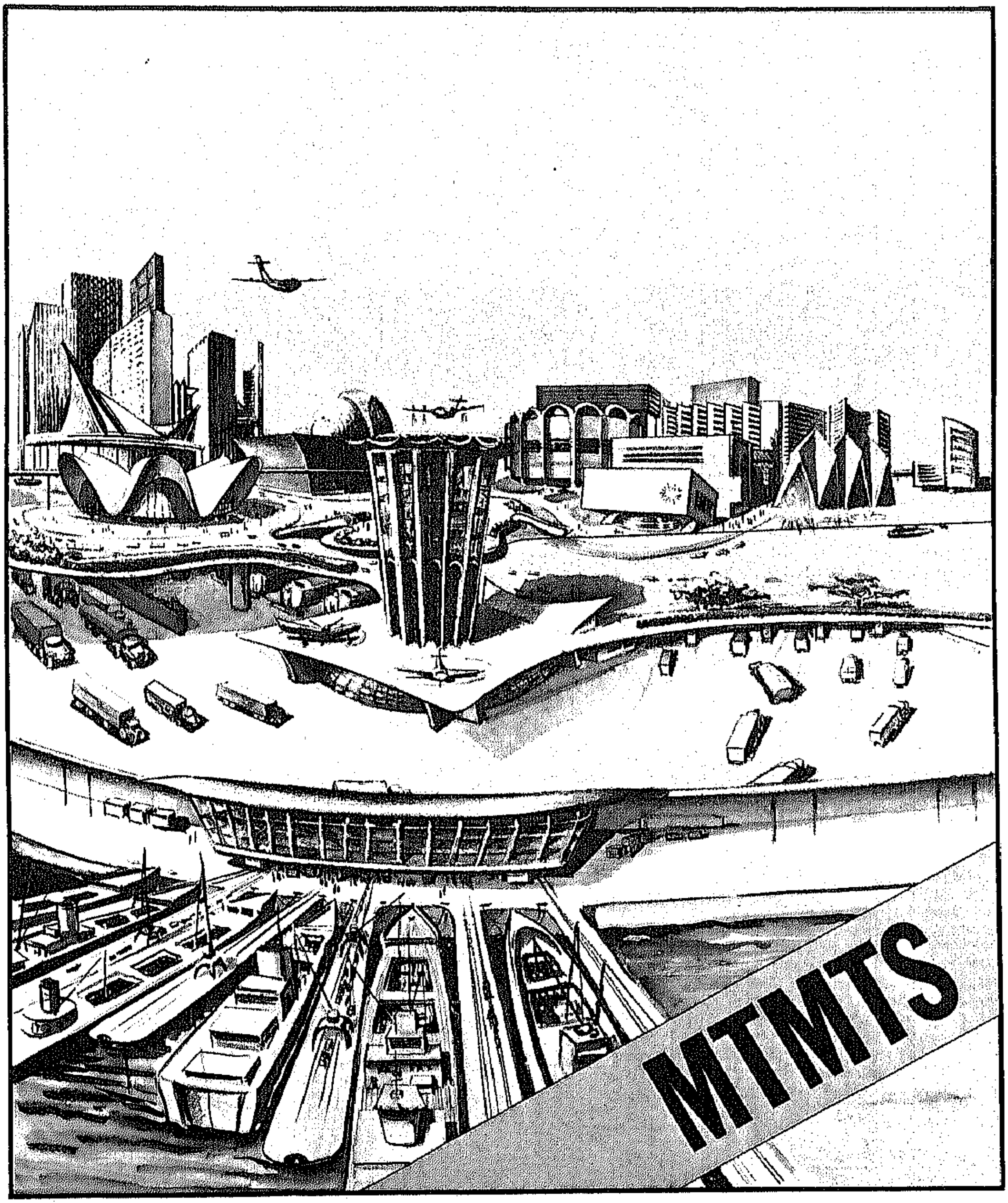

IN THIS ISSUE

FEATURES

DEPARTMENTS

The *Defense Industry Bulletin* is published monthly by the Business & Labor Division, Directorate for Community Relations, Office of the Assistant Secretary of Defense (Public Affairs). Use of funds for printing this publication was approved by the Director of the Bureau of the Budget.

The purpose of the *Bulletin* is to serve as a means of communication between the Department of Defense (DOD) and its authorized agencies and defense contractors and other business interests. It will serve as a guide to industry concerning official policies, programs and projects, and will seek to stimulate thought by members of the defense-industry team in solving the problems that may arise in fulfilling the requirements of the DOD.

Material in the *Bulletin* is selected to supply pertinent unclassified data of interest to the business community. Suggestions from industry representatives for topics to be covered in future issues should be forwarded to the Business & Labor Division.

The *Bulletin* is distributed without charge each month to representatives of industry and to agencies of the Department of Defense, Army, Navy and Air Force. Requests for copies should be addressed to the Business & Labor Division, OASD(PA), Room 1E764, The Pentagon, Washington, D.C. 20301, telephone, (202) OXford 5-2709.

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DEFENSE INDUSTRY
BULLETIN

Published by the Department of Defense

Managing Defense Transportation Requirements

Major General John J. Lane, USA

When Mr. McNamara became :he Secretary of Defense in 1961, he ;ook on a job that has often been lescribed as the second most difficult n the United States—second only to :he Presidency itself.

The problems he faced were fornidable. To begin with, he assumed :he responsibility of managing the vorld's largest corporate structure, vith an operating budget of $70 bilion or 10 percent of the Gross Na:ional Product. DOD's equipment, ma:eriel and real estate holdings were estimated to be worth some $150 bilion and it employed nearly four nillion people.

Perhaps the most complex and :hallenging problem he faced was 'matching" the nation's total trans)ortation resources—both military ınd commercial—to DOD requirenents. Judicious use of these reources, especially in the United States where nearly all military novements are generated, is vital to :he world-wide mobility of the Armed Forces.

One of his basic objectives was :o identify those areas of the total ogistical operations where good nanagement might produce desirable and lasting benefits. This en:ompassed such things as design and levelopment, acquisition, storage, listribution, maintenance and, of :ourse, transportation.

All of these factors play an im)ortant part in the establishment ınd maintenance of an efficient logis:ics system, essential to a nation :hat traditionally honors its interna:ional commitments. With troops sta:ioned in 101 countries of the world, :ransportation, as a key element of ogistics, assures that the vast DOD 'equirements are met.

When Secretary McNamara assumed his post, the DOD transportation team consisted of three transportation single-manager agencies.. The Military Sea Transportation Service (MSTS), established in 1949, was providing all of the sea transportation for the movement of DOD cargo and personnel. The Military Airlift Command (MAC), formerly the Military Air Transport Service, was established in 1956 for the movement of cargo and personnel by air between the continental United States (CONUS) and overseas theaters, and within the overseas areas. CONUS traffic management for all DOD components was performed by the Military Traffic Management Agency, established in 1956.

Maj. General John J. Lane, USA, is the commander of the Military Traffic Management and Terminal Service. He previously served as the commander of the U.S. Army Transportation Center and School, Fort Eustis, Va.; and before that he was assigned in the office of the Deputy Chief of Staff for Logistics, where he supervised the activities of the Army Supply Management Course and the Logistics Management Center at Fort Lee, Va.

In 1961, this agency was renamed the Defense Traffic Management Service. The Single Manager Agency for Sealift reported to the Secretary of the Navy, and the Single Manager Agency for Airlift reported to the Secretary of the Air Force. The Single Manager Agency for CONUS Traffic Management initially reported to the Secretary of the Army, but was transferred to the Defense Supply Agency in 1961.

The weak link in the transportation system was the split operations of the common user ocean terminals, and the input control of cargo into the air and ocean terminals. It was fairly obvious that further consolidation of transportation services, within the United States, was necessary to achieve greater efficiency and economy. Several inter-Service studies had already reflected the need for a single agency to properly interface th land traffic and the terminal : tions

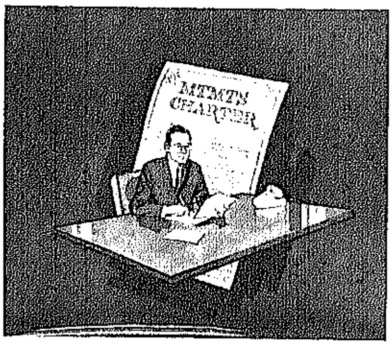
and objective of this assignment with respect to DOD military traffic, land transportation and common-user ocean terminals are:

• To eliminate duplication and overlapping of effort between and among Military Departments, Defense Agencies, and other components of DOD.

• To improve the effectiveness and economy of these operations throughout the DOD.

• To ensure that the approved emergency and wartime requirements of the DOD are met."

The assigned functions consisted primarily of those previously assigned to other DOD agencies, although in some areas the MTMTS role has since been broadened. Top priority was necessarily given to integrating these functions into an effective transportation management organization in order to carry out its responsibilities.



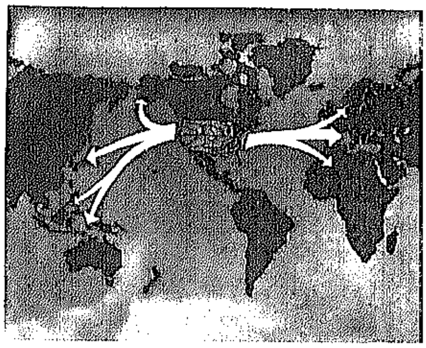
During the first two years a series of organizational and realignment actions was undertaken, each designed to permit better management and control. These included conversions of 15 unilateral or bilateral military ocean terminal organizations into four common-user terminals, thus achieving a measure of efficiency and economy. In addition, 15 military departmental elements at aerial ports of embarkation were converted into seven military air coordinating offices. Five defense traffic management regional offices were eliminated and two MTMTS Area Commands were established. By this latter action, the processing time for export release was reduced from six to seven days to 48 hours, thus significantly increasing responsiveness to the military users of MTMTS management services. These and subsequent realignment actions were oriented to the growing requirements of DOD, to a large degree directed by the Vietnam war.

The mission of MTMTS is to meet the military needs in peace and war, with the accent on wartime readiness and effectiveness. Our job begins at the time it is decided what is to be moved, where it is to go, and when it must arrive at destination. The what, where and when are not our decision. The how of movement and the control necessary to assure the when are the responsibility of MTMTS. Naturally, this dictates a good working relationship with a great many agencies—especially with MSTS, MAC and the commercial carriers. Of course, there are differences of opinion from time to time but these are usually resolved on a give-and-take basis. We have developed an understanding of each others problems, thus strengthening the kinship of purpose between us.

Dual Environment

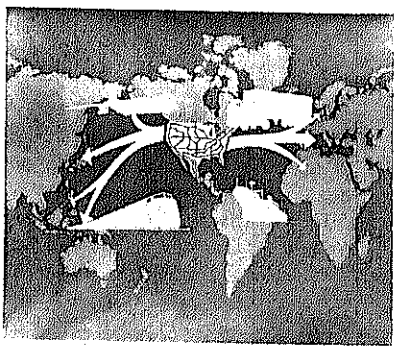
Vietnam has been especially challenging to DOD logisticians. Never before have we had to operate in such a unique environment. Our commitments in Vietnam impose wartime requirements on the other end of the logistics pipeline, while on this end we are required to function on a peacetime basis. Operating in this dual environment, we at MTMTS are obliged to act as a buffer. We absorb the shock of the rigid wartime requirements, and we translate those requirements into requests acceptable to the transportation industry. Thus, without unduly disturbing the peacetime pace at home, we see to it that men and materiel are moved to Vietnam on schedule.

It was impossible to predict the outcome of the task that lay ahead once it was decided to deploy large combat forces to Vietnam. The problem was not limited to merely deciding the quantity of materiel needed. How to get it there became a prime factor. Distance, geography and escalating demands, all had to be considered.



A logistics pipeline of this magnitude, extending over a distance of 10,000 miles, involves a host of interrelated factors, all of which must be brought into play in their proper time and place. Production, transportation and ultimate receipt on the far shores for onward distribution to our combat forces are, of necessity, related to one another. Obstructions at any point along the line can affect the efficiency of the entire system.

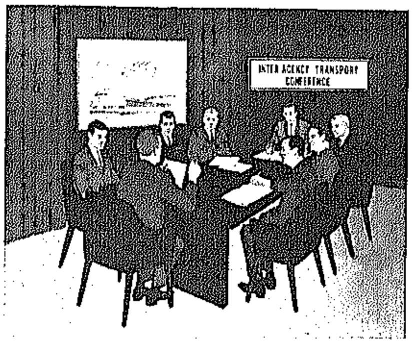
It is one thing to move supplies through a system when facilities are well established. It is quite another where facilities are virtually nonexistent. There was in South Vietnam only one deep water port—Saigon. Yet, in the first six months after our major deployment began, 200,000 troops were moved into the country and supplied with the thousands of items needed for combat operations and their health and welfare.



Control of available transportation in the United States and the flow of transportation to Vietnam was paramount. In the early days of the Vietnam buildup, delays in port discharges had an adverse impact on ship turn-around time. The inadequate logistics base on the other end slowed down port clearances considerably. As a result ship availability was reduced, requiring extraordinary measures to procure additional shipping. This critical problem was such that at one time 162 ships were somewhere enroute from the Continental United States, or being off-loaded or awaiting discharge in

Southeast Asia. MTMTS had to exercise the necessary control to ensure that priority cargo was moved, and the less critical cargo was delayed either at the port or the depot.

From less than 35,000 measurement tons shipped in January 1965, 800,000 tons per month are now being shipped. From the limited capability of one deep water port, seven modern port facilities are now in operation in South Vietnam. As a result, we are now processing more than 100,000 items ranging from fuel and ammunition to frozen meat and vegetables. These statistics reflect the tremendous effort that has gone into the rapid expansion of our logistics base, not only over-



seas but in the United States as well. These statistics are also indicative of the extent to which MTMTS and the transportation industry of the United States are involved in supporting our combat forces.

MTMTS Responsibilities

The broad and complex responsibilities of MTMTS embrace five basic functional areas:

• **MTMTS provides planning support to the Armed Forces on such matters as transportation management, ocean terminal operations, transportation engineering, and other related items.**

Transportation planning is a key logistic factor which must be considered in all defense planning strategy. At MTMTS, we regard transportation planning as the essence of logistics preparedness.

Our chartered responsibility in this important area falls into three categories: We develop internal transportation plans; we furnish planning support to the Armed Forces; and we plan for the utilization of commercial and military transportation resources in the United States in the event of emergency. These responsibilities naturally dictate extensive liaison with the Joint Staff, the Military Departments, other single-manager transportation agencies, and the commercial transportation industry in the United States.

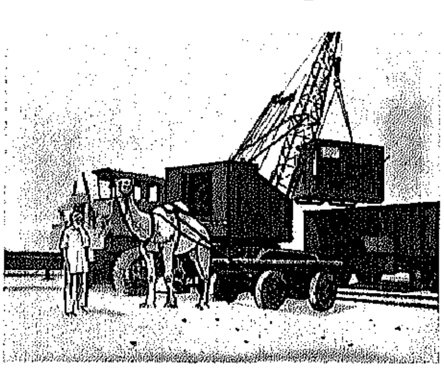
• **MTMTS operates assigned military ocean terminals in the United States, certain overseas terminal units, and the Department of Defense Railway Interchange Fleet.**

MTMTS operates 18 military ocean terminals and outports in the United States and nine overseas terminal units, primarily in support of Air Force activities in Europe, North Africa and the Near East. MTMTS was first tested two and a half years ago, when it arranged the movement of the First Cavalry Division (Airmobile) and the Ninth Infantry Division. Advance parties were quickly airlifted to Vietnam and the main body went by sea. The First Cavalry moved from ports on the East and Gulf coasts and the Ninth Infantry from the West Coast. Since then the workload through our west coast ports has nearly tripled.

Operation of the Department of Defense Railway Interchange Fleet involves control and maintenance of cars registered for service on the nation's rail lines. These cars are used to augment commercial capability not otherwise available.

• **MTMTS controls the procurement of commercial transportation services and the movement of traffic into air and through ocean terminals in the United States.**

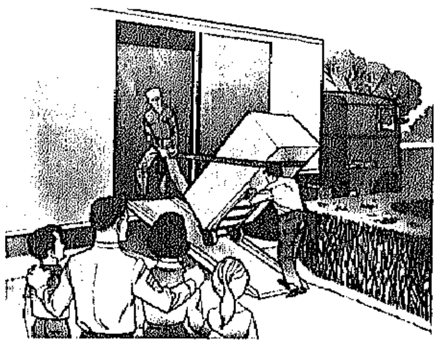
To perform this important task, MTMTS relies heavily on the commercial transportation industry of the United States. This basic policy was established on a government-



wide basis 13 years ago and reaffirmed last year. The application of this policy is not only in the national interest, but supports the specific interest and objectives of DOD. Reliance on commercial sources for transportation services precludes MTMTS procurement, operation and maintenance of transportation equipment and facilities at the risk of obsolescence.

During FY 1967, about 20 million measurement tons of cargo and a quarter million passengers were processed through MTMTS ocean terminals. At the same time, input to the air terminals amounted to 322,000 short tons of cargo and 160,000 passengers.

• **MTMTS manages the DOD personal property, moving and storage**

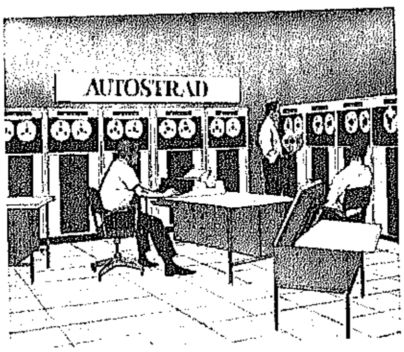


program on a world-wide basis. This function involves the movement and storage of personal property belonging to members of the Armed Forces.

This program, so important to the welfare and morale of the military family, is managed through the transportation officers at military installations who are actually the points of contact with Service members. MTMTS, however, provides the technical direction and supervision. The program, which annually results in about a million shipments, costs approximately $432 million annually. To provide more efficient and economical service to the Serviceman and his family, MTMTS has instituted a variety of new programs. Chiefly, these are the development of management tools to evaluate and govern traffic patterns, storage service, transit time, quality of service and shipper, and carrier performance. MTMTS believes these programs will contribute immeasurably to enhancing service, saving time, and cutting costs.

• **MTMTS develops integrated transportation data systems, through-movement programs, transportation engineering studies, and studies pertaining to highways for national defense.**

Technological advances and expanding military requirements demand bold and imaginative new programs. The developmental programs at MTMTS are tailored to improving strategic mobility and providing more responsible and economical service to DOD. The application of systems analysis and computers to transportation problems are expected to have far-reaching implications. AUTOSTRAD (Automated System for Transportation Data), with its varied sub-systems, is being designed to eliminate barriers to progress and responsiveness. Transportation engineering studies now under way will assure timely employment of cargo and personnel free from natural and man-made restraints. These studies include mode limitations, existing and planning transportation facilities, traffic flow patterns, documentation, and a host of related matters essential to along conventional lines except that there are two deputy commanders: Air Force Brigadier General Thomas L. Hayes is Deputy Commander for Management and Systems, and Rear Admiral Elliott Bloxom is Deputy Commander for Operations.



Operating on the principle of centralized control and decentralized operations, MTMTS is composed of two field commands and a specialized transportation agency:

• Eastern Area, with headquarters in Brooklyn, N.Y., is commanded by Brigadier General Arthur Hurow, USA.

• Western Area, with headquarters in Oakland, Calif., is commanded by Brigadier General John D. Crowley, USA. Both have Air Force deputies and like MTMTS Headquarters are jointly staffed throughout.

• The Transportation Engineering Facility, located at Fort Eustis, Va., is directed by Richard K. Hutson. He has an Army deputy.

(See organizational chart on page 6)

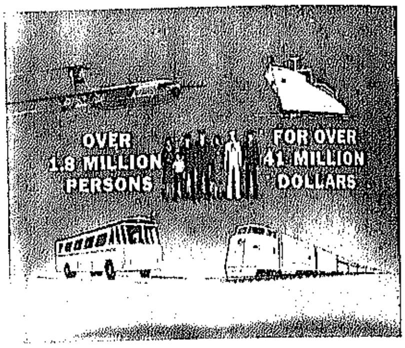
The line of demarcation separating the two field commands runs along the Mississippi River. Each command is responsible for domestic traffic management service within its boundaries. However, each has additional and sometimes unique responsibilities. For example, the Eastern Area controls and manages the DOD Freight Rail Interchange Fleet and has cognizance over all bulk liquid traffic—both tasks are national in scope.

The Western Area furnishes ocean terminal services at many points along the West Coast. During the past two years its workload has nearly tripled. The Eastern Area is responsible for terminal operations along the eastern seaboard, the Gulf Coast and the Great Lakes, plus nine overseas terminal units in Europe, North Africa and the Near East.

Financial Management in MTMTS

MTMTS has the responsibility for stewardship over a large portion of the DOD transportation dollars and has, as one of its command goals, the providing of high quality service which meets desirable time criteria at the lowest overall cost. In carrying out its role as a single-manager operating agency for military traffic, land transportation, and common-user ocean terminals, MTMTS influenced the expenditure of over $2 billion of DOD transportation funds in FY 1967 (Figure 1).

The $1.1 billion CONUS freight costs represent the total government bill of lading (GBL) and commercial bill of lading (CBL) DOD traffic moved in the United States in FY 1967.



From a dollar standpoint, personal property is the largest single commodity shipped by DOD. Personal property includes household goods, personal effects, unaccompanied baggage, professional books and equipment, and house trailers. The $498 million figure covers accessorial charges, such as storage, packing and crating, as well as transportation charges.

The $210 million CONUS passenger costs were incurred in the movement of DOD personnel by transportation requests within the United States.

The three major areas of fund requirements covered in Figure 1 are budgeted for by the respective Military Services. However, the expenditure of these monies, and economies realized, are strongly influenced by the management actions of MTMTS in carrying out its assigned traffic management functions. The remaining item of $260 million, covers operations of the MTMTS ocean terminals in CONUS, is funded by the Army Industrial Fund (AIF).

MTMTS operations under the AIF continue to expand in support of the war in Vietnam. The estimated FY 1968 expenses total $262.6 million consisting of the following:

	(Millions)
Contractual Services	$136.6
Cross-Service Agreements	57.4
Salaries and Wages	53.2
Materials and Supplies	9.8
Other Costs	5.6
Total	$262.6

Contractual services and cross-Service agreements are primarily for cargo handling and related terminal costs. The cross-Service agreements are with the Navy to handle cargo, for the most part ammunition and explosives, through Navy terminal facilities.

The AIF is a revolving fund and revenue is generated through charges made to ordering agencies (customers) which include shipper services, tenants, military and commercial vessel operators, railroads and others. Also, reimbursement is made from Army appropriated funds provided MTMTS for carrying out its traffic management mission.

The goal in AIF management is to operate on a break-even basis so that, on the one hand, the corpus of the fund will not be depleted while, on the other hand, an overcharge will not be made against customers, these customers being primarily other government agencies. The estimated FY 1968 revenue by mission is:

	(Millions)
Cargo Handling	$200.3
Auxiliary Cargo Services	5.0
Parking Services	3.7
Traffic Management	17.0
Services to Commercial Vessels	9.2
Services to Military Vessels	10.1
Passenger Processing	2.3
Support of Tenants	6.9
Defense Rail Interchange Fleet	1.6
Mortuary Services	1.1
Military Family Housing	.3
CONEX Container Repair	.2
Other Products and Services	4.9
Total	$262.6

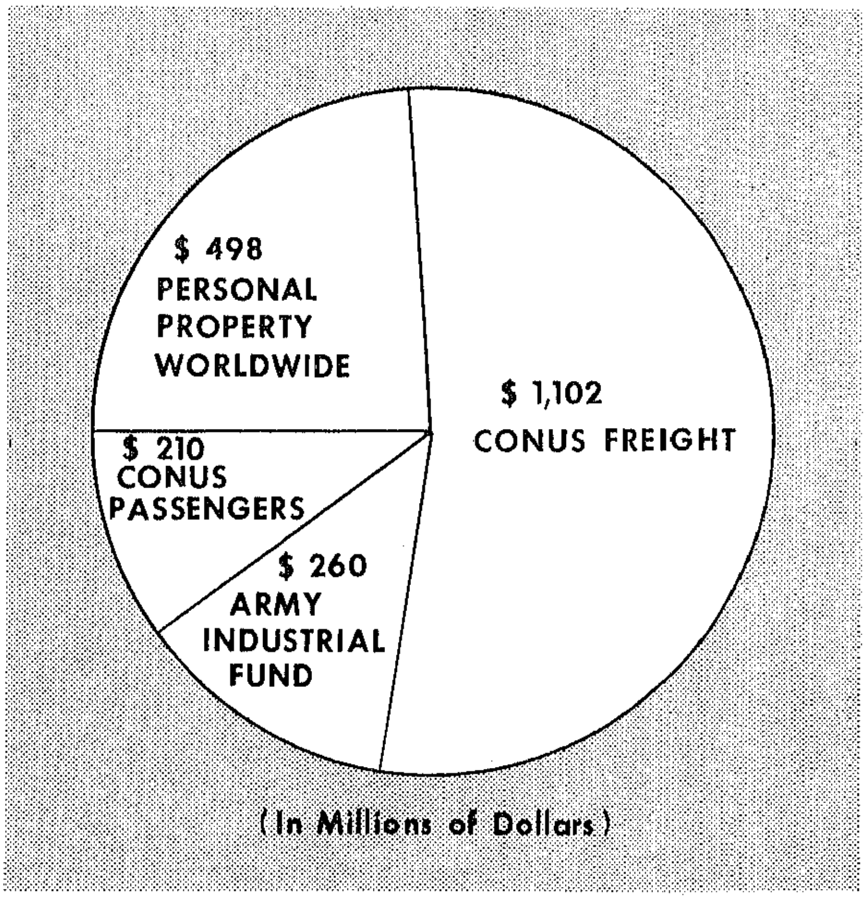


Figure 1.

Pre-determined rates are developed covering the majority of services furnished, such as cost by commodity for cargo handling, cost by passenger for processing, and space occupancy charge for tenant agencies. Rates for mileage compensation for MTMTS-owned railway freight and tank cars, assigned to the Interchange Fleet, are based on those published by the Interstate Commerce Commission in the Mileage Tariff-Series 7–Z, ICC H–3. Mortuary services are performed at the Oakland Army Base for returned war dead with reimbursement made by the Military Service concerned. The cost for operating and maintaining military family housing is reimbursed from the Army appropriation for military family housing based on direct costs plus applied overhead.

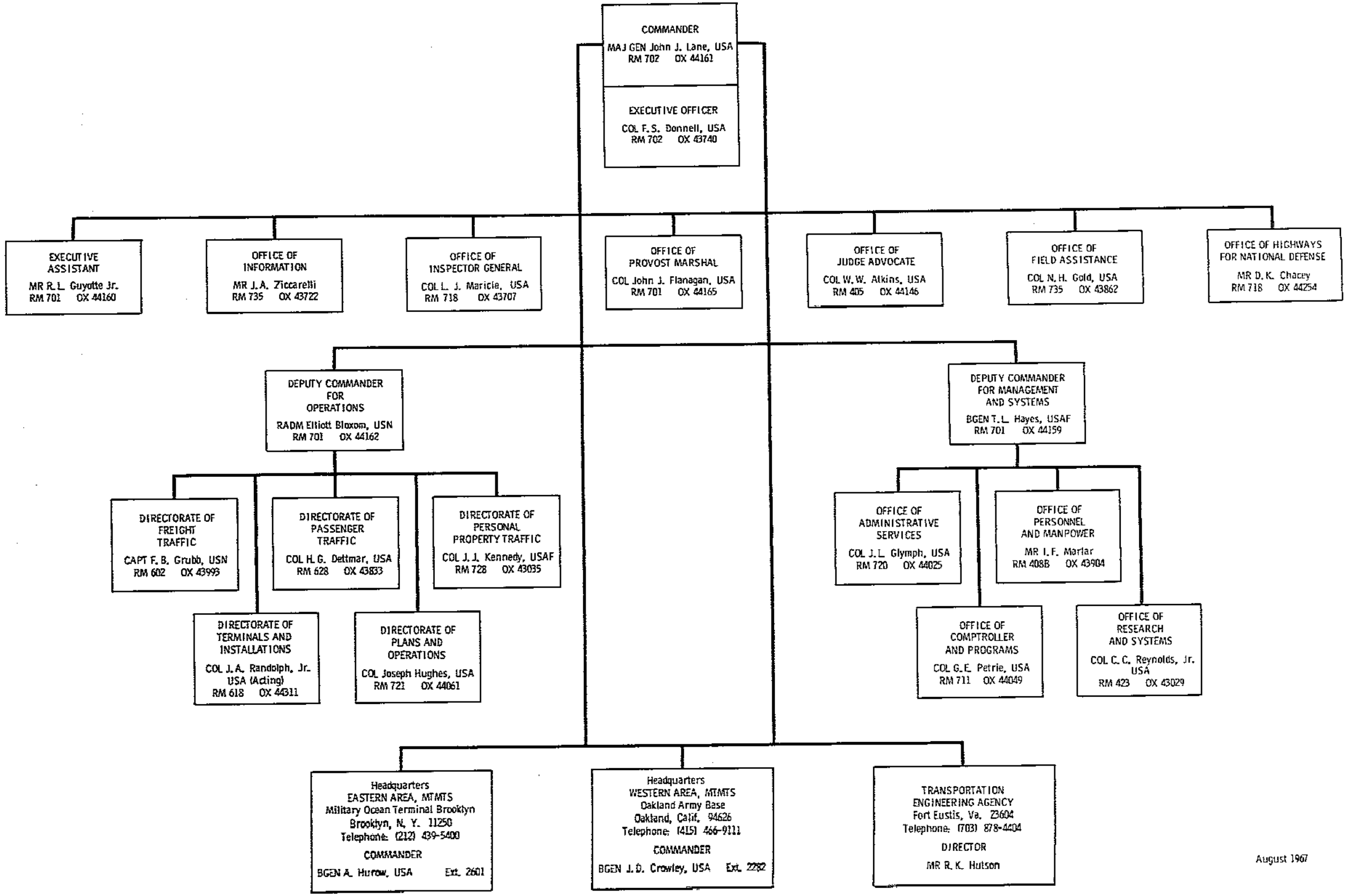
Development Programs

During the past two years a great deal of progress has been made in developing integrated transportation information data systems. AUTOSTRAD, with its subsystems, will assist the management and accelerate the movement of the increasing volume of DOD cargo and passengers. The plan provides for six major functional systems corresponding to MTMTS functional areas of responsibility.

The problem of maintaining status of shipments and knowing what is in the transportation pipeline has plagued the traffic manager for many years. Manual tracing methods are normaly very slow and unreliable. As an initial effort to correct this situation, a Shipment Status System has been designed, called STATEM. This system will provide the traffic manager the status of a given shipment, and/or the inventory of a specific commodity in the transportation pipeline en route from the shipper to the overseas port of discharge. The traffic manager will use a remote input/output device to make inquiries and receive information on shipments of critical items currently in the pipeline. Initially, this system will include critical items en route to Southeast Asia. Subsequently, it will be expanded to include critical items in the pipeline world-wide.

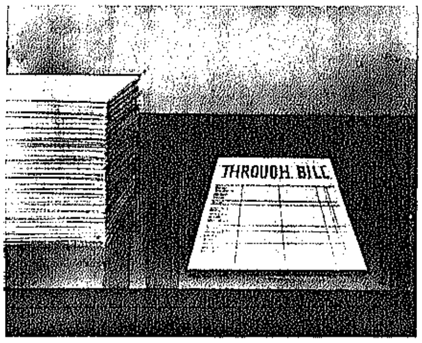
One of the critical problems in managing the Personal Property

HEADQUARTERS MILITARY TRAFFIC MANAGEMENT AND TERMINAL SERVICE
Washington, D. C. 20315



August 1967

Program has been a lack of sufficient data on household goods movements, such as cost and quality of service. Prior to the establishment of MTMTS, there was no single cohesive system to bring this data together in an effective manner to support appropriate policy development or revision. The world-wide Household Goods Information System for Traffic Management, which we have termed WHIST, is an integrated system which is being designed to provide timely and complete automated data for evaluating the DOD Personal Property Traffic Program, based upon the three dimensions of service, time and cost. At the present time eight of the 15 WHIST subsystems are operational. The WHIST subsystems currently operational in-



clude the automation of Through-Government-Bill-of-Lading and Government-Container-Method rate data, for use by transportation officers at military installations, and automated data summaries for evaluation of carrier performance. WHIST, when fully implemented, will provide a complete range of detailed and summary traffic management information to assure that military personnel receive quality service in a timely manner and at reasonable cost to DOD.

Concurrent with the development of new systems, we are upgrading our computers and peripheral equipment. When MTMTS was formed, we inherited several dissimilar computer installations at our various commands. The lack of compatibility of these computers, coupled with an increasing data processing workload in support of Southeast Asia operations, created a severe shortage of computer capability. High speed, mass storage, third generation computers were urgently required. During the latter part of 1966, we completed the numerous technical and administrative actions required to procure new computers. In August 1967, identical B5500 computers were installed at our Eastern Area and Western Area commands. In addition to their increased speed and processing capability, the B5500s will permit standardization of area data systems. This will facilitate interchange of data between the area commands and permit reciprocal computer support.

Terminal Modernization

One responsibility of MTMTS is the operation of ocean terminals. During the first two and a half years of operation, our ocean terminals experienced a tremendous increase in workload. In FY 1967 almost 21 million measurement tons moved through the CONUS terminals. This represents an increase of approximately five million tons over the amount moved in FY 1966.

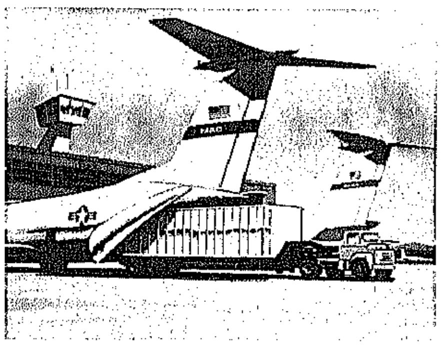
A remarkable side of this workload performance is that all this tonnage was being moved at a time when MTMTS was realigning and consolidating its terminals. Nevertheless, we were able to meet the challenge of Vietnam without delays. We now load ships for a single port of discharge in Vietnam, thus increasing the turn-around time of much needed ships and reducing port congestion as well. At the same time we are modernizing the Military Ocean Terminal at Bayonne, N.J., and the Military Ocean Terminal Bay Area at Oakland, Calif., both high on the priority list in MTMTS planning for the future.

At Bayonne plans have been developed for conversion to automated controlled and mechanized receiving, sorting, distributing and container-stuffing facilities. Third generation automatic data processing equipment will be used to direct the sort-

ing and movement of the cargo. The plan also provides for a container storage area capable of accommodating 2,000 40-foot containers, as well as expanding berth facilities at both terminals to efficiently handle roll-on/roll-off ships.

One of our terminal problems is the massive administrative workload associated with daily inventories and the manual development of required detail, applying to thousands of shipments from hundreds of points of origin to hundreds of destinations.

The speed and data-compiling capabilities of third generation computers will provide the means to evaluate the time a shipment "sits" in a terminal prior to being loaded. Operating techniques, releasing and booking procedures, and the time



frames prescribed by various directives can be benefically refined as a result of a new "Time-in-Terminal" report recently developed by MTMTS.

The report is designed to summarize all cargo lifted from ports of embarkation to ports of debarkation by priority, percentages of priorities, commodity, sea express, privately owned vehicles, household goods and other cargo. The report will indicate the time spent in the terminal and the reason for delay, if delayed.

The report is expected to become an invaluable data bank and management tool for all elements connected with export movements of cargo.

Container Services

The rapidly increasing availability and use of container services is the single most important development in transportation today. We estimate that more than 60 percent of all military cargo shipped can be moved in containers where such services are available. We are now shipping virtually all cargo in containers, which

can be shipped via that method, to Alaska, Hawaii, Okinawa and Puerto Rico. We are increasing use of container service to Europe and the United Kingdom, (now about 40 percent), the Mediterranean, Japan, the Philippines and South Vietnam. We also anticipate institution of container service to Korea, Taiwan and Thailand as the situation warrants.

Such services are having an impact on the requisition, procurement, supply and delivery cycle through reductions in packaging costs, loss/damage/pilferage, and transit time. We are also endeavoring to increase the use of container service in the movement of material directly from supplier to user, in order to gain the maximum benefits.

Project TICO

Project TICO (Through Intermodal Container Operation) was established in MTMTS on March 1, 1967, for the purpose of implementing command policy for the full exploitation of the through-container through-government bill of lading (TGBL) concept. Progress, while not as rapid as we desire, is steady and results are being obtained. Traffic flow patterns, identifying containerizable cargo on second destination traffic, have been developed and are being furnished on a monthly basis. This data is utilized to approach the transportation industry for through-movement tenders. Currently, 165 TGBL tenders have been accepted and distributed for use.

It is proposed to capture, in the near future, traffic flow patterns on first destination traffic. Plans are in effect for an education and training program to apprise DOD shippers of latest developments and accomplishments on containerization. Further gains are expected in the areas of funding, additional through-container tenders, reduced and simplified documentation, clarity in the areas of uniformity, and legislation more favorable to intermodal operations.

Rail Modernization Program

MTMTS owns a fleet of 5,403 rail cars which are in operation on the nation's rail lines. Eight hundred and ninety-five of these are a specialized DF (damage free) type boxcar, ideally suited for the movement of ammunition and explosives by rail and generally not available from the railroads. The DF boxcars were acquired by the Services during the Korean conflct and are over 15 years old. As a result, a five-year boxcar modernization program is being undertaken. It will embrace the procurement of 1,000 hy-cube specialized DF boxcars in 200-car increments annually beginning in FY 1969. This program will cost $4 million annually through the total procurement period; however, each car purchased will result in a net advantage, or savings, to the DOD in excess of $5,000 per year.

Troop Support

During the period April 1965 through August 1967, approximately 17,000 carloads and 5,400 truckloads were utilized in the movement of unit equipment within CONUS in connection with the Southeast Asia buildup, at an estimated cost of $35.7 million. Due to the occasional shortage of rail equipment CONUS-wide, a close surveillance program was initiated to insure maximum utilization of carrier's equipment. Transit times and good service routes were developed to insure timely arrivals at outloading ports. As a result, delays in transit have been negligible.

Air Export Control

Recently DOD recognized that certain categories of material being airlifted to points outside CONUS were generally suspect for movement by air. In this regard DOD directed MTMTS, as the airlift clearance authority, to initiate a stricter "challenge for air eligibility" program for certain commodity groupings, as well as air shipments resulting from supply actions taken more than six months ago. Even though it is recognized that the identification of air eligibility is a function of the Service, the revalidations required by challenge actions from MTMTS has:

- Assured that only material that is truly airworthy is in the airlift system.
- Diverted shipments, screened or challenged out of the system with shipper Service concurrence, into the sealift system as sea express cargo.

Cost Avoidance

During FY 1967, MTMTS experienced a cost avoidance of approximately $25 million attributable to negotiation actions conducted with the transportation industry. Of this amount, approximately $18 million was the direct result of successful rate negotiations, conducted on the basis of volume movement reports received from all shipping sources of DOD. The balance resulted from transit negotiations activities.

This is a continuing program which we feel holds great promise.

A significant aspect of the role of logistics in peace and in war is the vital CONUS movement link. This is the link which must be capable of initiating the first phase of military response to distant crisis, and of meeting the longer term requirements of the inevitable buildup of forces and supplies. This link is the specific province of MTMTS.

Quick reaction to DOD's vast requirements necessitates the maintenance of a readiness posture sufficiently flexible to meet all possible contingencies. MTMTS must maintain a current awareness of personnel and equipment configuration of units; it must know the loading rate and locality of units; it must know the availability of aircraft, rail equipment and motor vehicles—both commercial and military; it must assess the fluidity of air and ocean terminals; and it must control and regulate the movement of units compatible with the availability of ocean shipping and intercontinental airlift. Precise scheduling and, of course, detailed and continuous planning is required.

The key to the orderly flow of military movements to Southeast Asia, we believe, has been the result of our control of the initial movements in the United States. At the same time, this success is a tribute to logistical and transportation managers of the three Services and the American industrial base on which we must depend. Our reliance on the transportation industry has been a vital factor in the establishment and maintenance of our defense transportation systems. This splendid DOD/industry effort has prompted General Westmoreland to state that,

"Never before in the history of warfare have men created such a responsive logistical system. . . . Not once have the fighting troops been restricted in their operations against the enemy for want of essential supplies."

MILSCAP

How Will It Affect the Defense Contractor?

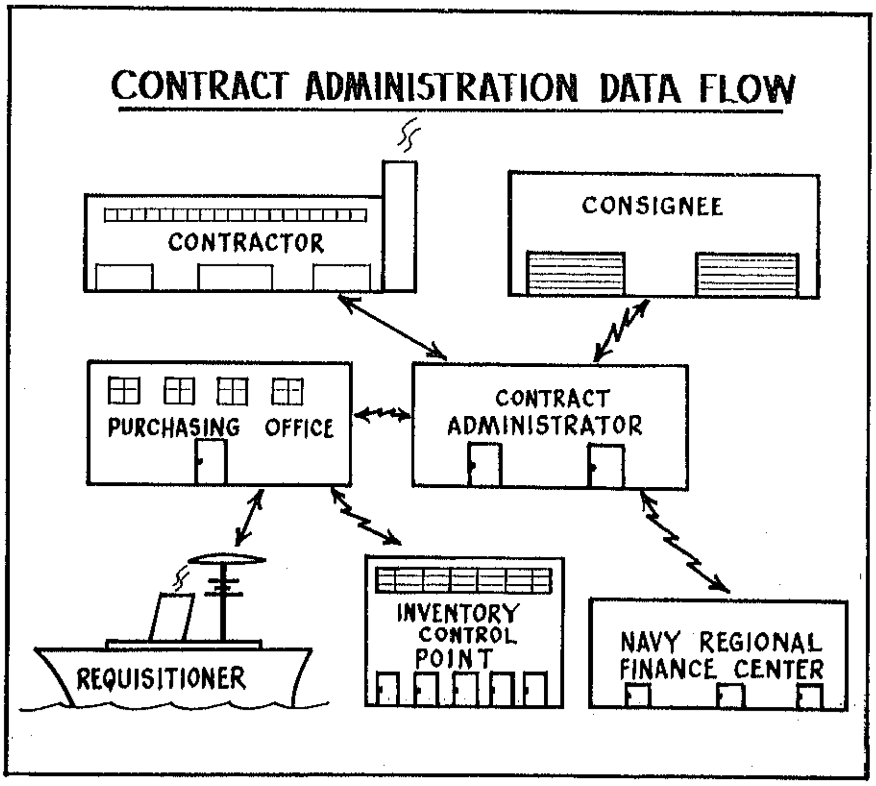
Commander A. G. Cavanaugh, SC, USN

Military Standard Contract Administration Procedures (MILSCAP) is a DOD data system, designed to translate into punched card form the essential elements of contract content, in order to take advantage of rapid communications techniques and allow it to be processed mechanically. It will put into the hands of DOD contract administrators and contracting officers a considerable amount of information on contract status and contractor performance. Industry is beginning to ask "What will this mean to me?" A description of the system may provide the answer to that question.

The purpose of MILSCAP, developed by the Defense Department for use by the Military Services, the Defense Supply Agency and the Defense Contract Administration Services, is to standardize information data in the functional areas of procurement, contract administration, inventory control, storage and financial accounting.

The new system will replace a variety of non-standard procedures now in use by procurement and contract administration activities throughout DOD. MILSCAP will be installed progressively because of its impact on existing procedures and may require two or three years for complete implementation.

MILSCAP will be an integral part of other DOD standard logistics data systems, such as MILSTRIP (Military Standard Requisitioning and Issue Procedures), MILSTRAP (Military Standard Transaction Reporting and Issue Procedures), and MILSTEP (Military Supply and Transportation Evaluation Procedures). Procedures under MILSCAP are authorized by DOD Directive 4105.63 and are described in detail in DOD Manual 4105.63-M.



At the time a contract is executed a set of punched cards, called an abstract, will be prepared at the purchasing office. Administrative data cards will contain the contract number, effective date, codes to identify the purchasing office, the contractor, the paying office and the administrator, discount terms, authority delegated to the administrator, and other data applicable to the contract as a whole. Item data cards will describe the material or services being procured with a stock number, manufacturer's part number, a brief description, quantity and price. Schedule cards will contain delivery dates and consignee identification. Accounting cards will cite the funds to be charged.

This contract abstract will be immediately transmitted to the field administrator via the Automatic Digital Network (AUTODIN), the DOD communications network. The administrators are the regional offices of the Defense Contract Administration Services or the plant representatives under the operational control of the Army, Navy and Air Force. The data will be recorded in a master contract file at the administration offices in some type of memory device which will be readily accessible for inquiry, and will provide management with

current information in the form of printed reports.

The system also provides for follow-on communications between the purchasing office and the field administrator, and a means to update the contract file. Formats are prescribed for revising the abstract, based on modifications issued by the contracting officer. Message cards will request the administrator to negotiate accelerated deliveries, provide line item status, and furnish supplemental information.

Flowing in the opposite direction, formats are being developed to permit the administrator to request additional information from the contracting officer, to advise him of a potential or actual slippage in delivery dates, and to reply to his requests for status or accelerated delivery. The system also provides for mechanized shipment notices to supplant the present distribution of the contracting officer's copy of the Material Inspection and Receiving Report (DD Form 250). It allows consignees to report acceptance of material via AUTODIN, and the transmission of payment notice cards to the cognizant accounting offices in lieu of hard copy vouchers.

Originally MILSCAP was conceived as a communications link between agencies of the Defense Department. How then will it affect the contractor? The astute contractor will recognize that the impact may be substantial as the system will give to the administrator a wealth of contract status information and, thus, contractor performance data, the end result being closer surveillance of delivery date slippages.

The Government enters into an agreement with a contractor for the delivery of goods by a specific date. This date is established to meet a specific need and the contract price is generally affected by this requirement. The value of the goods theoretically diminishes when delivery occurs after the established date, therefore a monetary consideration should pass to the Government in these cases. We can deduce from this that the contractor, who enters into a contractual arrangement with the knowledge that he cannot comply, has an unfair advantage over his competition. His competitors may have quoted the job on an extra effort basis, thereby pricing themselves out of consideration.

The data available from MILSCAP, therefore, should work to the advantage of the scrupulously honest contractor and against those who have a tendency to base their quotations on minimum effort, regardless of delivery requirements, by assuring that the Government is adequately compensated for delivery delays which are the fault of the contractor.

What other impact will MILSCAP have on the defense contractor?

The information on past performance of contractors will be available to contracting officers in the MILSCAP data bank to assist in future bid evaluations.

The "standardization" effect of MILSCAP will result in a reduction in the number of special reports required, providing a welcome relief to contractors harassed by requests for reports.

Faster payment of invoices will be possible due to the reporting of receipts by AUTODIN instead of mail. The benefits of this procedure should begin soon because of expected early implementation of this portion of MILSCAP.

Contractors may be asked to provide certain information to administrators in MILSCAP format, *e.g.*, shipment notice cards, revised delivery forecasts, etc., to facilitate transfer of information to contracting officers.

MILSCAP implementation is still two or three years away and a good deal remains to be done during this period. Operating procedures must be developed, hardware and personnel assets must be acquired, and a pilot test must be conducted. Still it is not too early for the defense contractor to be thinking about MILSCAP, for he must eventually come to grips with the possible impact on this program on his operation.

Commander A. G. Cavanaugh, SC, USN, as MILSCAP Coordinator in the Office of the Chief of Naval Materiel, is responsible for development and implementation of the MILSCAP Program. He is a 1950 graduate of Rutgers University and was commissioned in the Navy Supply Corps in November 1951.

U.S. Army Metrology and Calibration Center Activated

The U.S. Army has activated a Metrology and Calibration Center at the Army Missile Command, Redstone Arsenal, Huntsville, Ala., consolidating all calibration and metrology functions of the Army.

Among the new missions of the center is management of the world-wide calibration effort at 13 locations. In addition, primary reference calibration responsibilities have been assumed from Tooele Army Depot, Utah.

Nucleus of the new facility is the former Metrology Center, previously a part of the Directorate of Arsenal Support Operations. It has been established at the same level as the command's several major directorates. Lieutenant Colonel Peter L. Hume will head the center.

Newly acquired responsibilities of the center include management, technical direction, fundamental metrology, and engineering support for the Army's calibration and metrology mission.

The Alabama center will also be the focal point for inventory control and procurement. In these areas it will coordinate with other command directorates which have the basic missions for handling these functions.

The Interagency Data Exchange Program

George S. Peratino

Office of Deputy Chief of Staff, Systems & Logistics
Headquarters, U.S. Air Force

The Interagency Data Exchange Program (IDEP) originated when the Army, Navy and Air Force ballistic missile agencies combined their efforts to solve an urgent problem that concerned all three Services: duplication of testing efforts. Many designers, developers and producers of military materiel were performing nearly identical tests on a particular type of component or material. Such duplication had to be paid for ultimately—by U.S. taxpayers—in higher defense costs. More effective component testing and data distribution would improve scheduling of the nation's new missile projects.

Original approval of IDEP was obtained in 1959 from the commanders of the Army and Air Force ballistic missile programs and the Navy Special Projects Office.

Today the program has been approved at the Assistant Secretary level for Research and Development in the Army, Navy and Air Force. In December 1966, IDEP became an interagency program when the Assistant Administrator for Industry Affair of the National Aeronautics and Space Administration (NASA) signed the current charter.

Organization

IDEP's organization is an outstanding example of cooperation among the Military Services and NASA, who fund the program, and the industry participants. The IDEP Policy Board consists of one representative from each Service and NASA. The board develops and approves program policies and management procedures for the administration of IDEP. Each Service maintains an IDEP office, through which program materials and services are provided to all participants. Representatives from the IDEP offices and the Policy Board meet regularly to maintain a cooperative approach toward all aspects of the IDEP operation.

The Contractors Advisory Board, elected from participating industry members, provides assistance and guidance to the IDEP offices and the Policy Board to reflect the changing needs of industry participants.

How IDEP Functions

Since IDEP's establishment in 1959, emphasis has been on the immediate transmittal of current information directly to potential users. The intent of IDEP is to have the data waiting for the engineer rather than to have the engineer waiting for the data.

Participants in IDEP submit test reports and specifications to the IDEP offices on electronic, electrical, mechanical and electro-mechanical parts and components; materials; production processes; pyrotechnic test equipment devices; procedures; reliability information; and many other subjects.

The IDEP offices provide each participant, free of charge, with a complete report file on microfilm. Currently there are over 20,000 reports on more than 30,000 separate items in the file, estimated to have cost at least $50 million to create. Each month 250-300 new reports are added. A simple, proven retrieval system makes any of this information available to the engineer within seconds of his request.

Ease of Data Retrieval

The IDEP data retrieval system is designed for rapid, error-free use without elaborate equipment. A quarterly report listing, arranged by a nine-digit, part-identification code, refers the engineer directly to the part/component group in which he is interested. Once within this group, he can further identify each report by part description and number, test environment, vendor, etc. Or, rather than use this index, he can use IDEP's visual coincidence report indexing system, a set of perforated cards indexing each report by part type and test environment, to immediately identify all reports which satisfy these search criteria.

In either case, the indexing system will refer the engineer to one or more microfilm cartridges. Using a microfilm reader-printer, he can locate and scan a report and, if desired, obtain a full-size copy of any page in a matter of seconds.

Advantages to Federal Government

Each report in the IDEP system represents unlimited potential savings in time, dollars and technical skills. Where a report in the file indicates that a part satisfies some or all of an engineer's requirements, he can reduce or eliminate what would have been a redundant test. A recent annual IDEP survey documented over $5 million in such savings. Such savings include only planned tests which were shortened or eliminated.

Advantages to Industry

An estimated 20-30 percent of a design engineer's time is spent in data search, much of it frustrating and unsuccessful. Even if he gets the information he needs, chances are that it cost him a lot of valuable time away from his work. IDEP provides a proven means of reducing the expenditure of time and money by placing, within easy reach of the engineer, the information he needs to do his job. It makes available component information generated by other engineers working on similar problems for other government-funded projects. IDEP benefits to the industry participant are:

- Efficient information retrieval.
- Realistic bid proposals through access to current parts information.

• Reliable parts selection in designs to avoid possible systems failures.

• Advanced parts information to promote improved performance; shortened delivery schedules.

• Improved test reporting resulting in higher output per test dollar.

• Accelerated parts specification writing and test planning—expediting eventual introduction of standardized improved parts.

• Provision of direct intercontractor inquiries in urgent cases.

• Suggested alternate vendor sources.

• Source of general advice, confirmation, and general education at early program development stages.

How To Participate

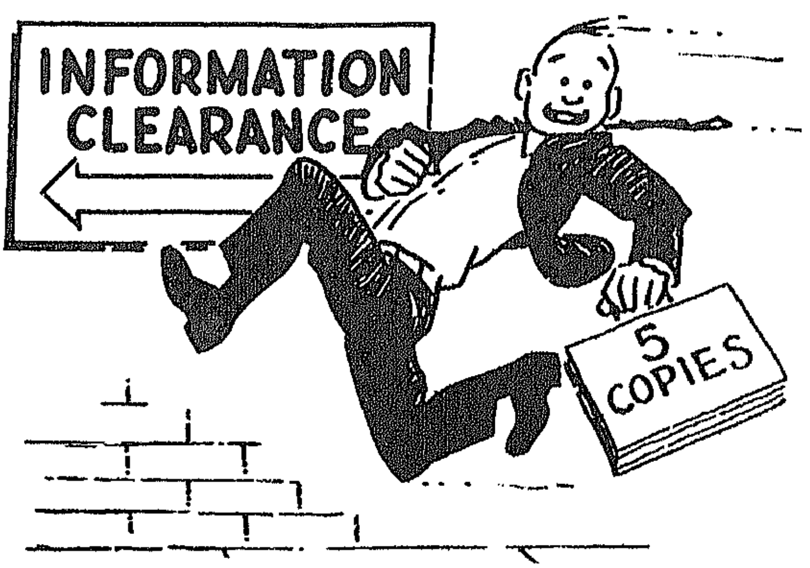
Eligibility for IDEP participation is limited to government agencies and contractors who are users of parts and components procured for incorporation into the design, development and production of equipment for weapon systems and ground based command and control systems. IDEP was established on a voluntary basis. A participant must submit test reports to the IDEP before being eligible to receive the test reports submitted by other participants. Participation in IDEP cannot be charged against government contracts. The benefits of participation far exceed the small investment in money, manpower and time required to establish and maintain an IDEP operation. Additional information concerning IDEP can be obtained by contacting one of the following IDEP offices:

Air Force IDEP Office
Space & Missile Systems Organization
Los Angeles Air Force Station
Air Force Unit Post Office
Los Angeles, Calif. 90045

Navy IDEP Office
Naval Ordnance Laboratory
Corona, Calif. 91720

Army-NASA IDEP Office
Redstone Scientific Information Center
Redstone Arsenal, Ala. 35809

The Federal Government, through the IDEP, has made available a dynamic data exchange program. It is now up to industry to participate in this important program.



Industrial firms holding Navy contracts with components of the Naval Material Command can speed up security clearance of news items, advertisements, and other information proposed for release to the public by observing a few simple rules.

First, contractors should submit a minimum of five legible copies of all information to be released, including photographs, maps, charts, etc. The multiple copies are necessary to permit simultaneous review by the various agencies or branches which may be required to examine the material.

Contractors should give the title and description of the material and specify how, when, and where it is proposed to be released.

The time required to clear information for release varies with the length of the material, its complexity, and the number of agencies required to review the material. Normally, the procedure takes from two to five weeks.

The material proposed for release should be sent to the Naval Material Command, Public Affairs Office (MAT 09D), Room 1151, Main Navy Building, Washington, D.C. 20360. The Public Affairs Office coordinates clearance for the six systems commands, 12 project offices and 15 laboratories which comprise the Naval Material Command.

New Army Division Approved

Secretary of Defense Robert S. McNamara has approved a plan to add a new division to the Army, bringing the total number of divisions in the active force to 19 and 2/3.

Formation of the division, designated the Sixth Infantry, and new support units will begin in January 1968. The first brigade of the division completed its training in September.

The FY 1968 budget now calls for an Army strength of 1,520,000 troops, as of June 30, 1968. Revised calculations of the manpower, needed to support Southeast Asia deployments and to continue the one-year tour in Vietnam, will permit substantial reductions in trained strength requirements previously planned for the Army. In addition, some of the Army uniformed jobs will be turned over to civilians.

As a result, the new division and the support units will be formed without significant increases in Army spending.

The net impact of the additions and reductions will result in an Army of 1,521,000 men by the end of FY 1968.

Part of the new division will be formed at Fort Campbell, Ky., and will use facilities vacated there by the remaining brigades of the 101st Airborne Division, which will be sent to Southeast Asia. One brigade of the new division will be activated in Hawaii.

Dynaplane Boat Design Less Drag—More Speed

Model tests and computer studies at the Naval Ship Research and Development Center, Carderock, Md., have shown that the resistance of military planing boats now in use can be reduced 50 percent by design methods developed by the center.

The marked improvement in performance is achieved by means of a planing configuration, called the Dynaplane boat, which has less than one-fourth as much friction producing wetted area at high speed as the conventional planning boat design (Figure 1).

The forward lifting surface of the Dynaplane boat is designed to carry 90 percent of the total weight, while the remaining 10 percent is carried by an adjustable planing surface or stabilizier in the stern. The main lifting surface is curved (cambered) longitudinally so that it will develop the required lift on a small wetted area and, therefore, will have the least possible drag.

Shape of the camber is based on analytical work carried out by the National Aeronautics and Space Administration. This camber line curves upward in the foreward part and downward in the after area. The detailed shape of the curve for a particular boat depends on the speed and weight of the boat, and is configured by the designer so that it will develop the required lift with the least possible drag. The cambered surface ends in a step so that the flow will separate from the afterbody of the hull. The step is one-eighth of an inch deep on the eight-foot model which was tested at the center. Accordingly, it would be one-half inch deep on a 32-foot boat.

The adjustable stern stabilizer is connected to a pneumatic piston, located inside the hull in such a way that its vertical position can be controlled by compressed air. At low speeds the stabilizer is held in a retracted position against the hull, with its bottom surface parallel to the afterbody keel. At high speed, the stabilizer is lowered by admitting compressed air to the top of the cylinder. As the stabilizer moves downward, it automatically changes from a negative to a positive angle of attack. The stabilizer then planes on the surface of the water and trim angle of the craft can be regulated by adjusting the stabilizer's vertical position. In other words, when the stabilizer is moved away from the hull, the stern is lifted and the trim angle of the craft is reduced and, when the stabilizer is adjusted to a position close to the hull, the stern moves closer to the surface and the trim angle of the craft is increased.

Accordingly, in smooth or moderately rough water the stabilizer can be used to trim the craft to the angle of least drag. Alternatively, in rough water the stabilizer can be used to trim the craft to the most suitable angle for the particular wave condition and relative heading.

Characteristics of the Dynaplane design can be advantageously applied to a wide variety of naval craft including patrol boats (Figure 2), landing craft (Figure 3), personnel transports and swamp boats, as well as commercial and pleasure craft.

The feature of greatly reduced drag can be exploited to produce either faster boats with no increase in power, or boats of equal speed on reduced power. The latter possibility of attaining the same speed as a conventional high-speed boat, on only half as much horsepower, will result in 50 percent savings in both engine cost and fuel rate, with a 100 percent increase in high-speed range.

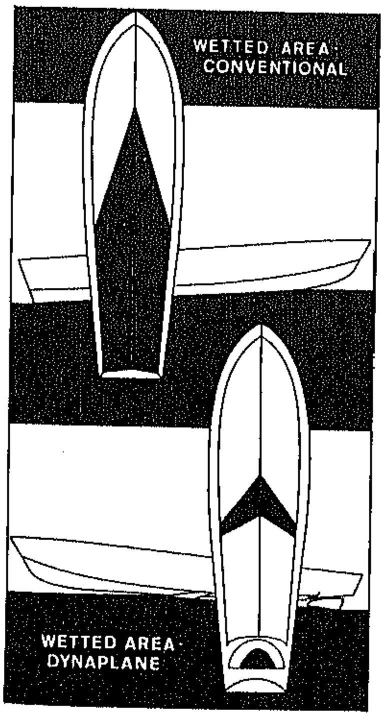


Figure 1.

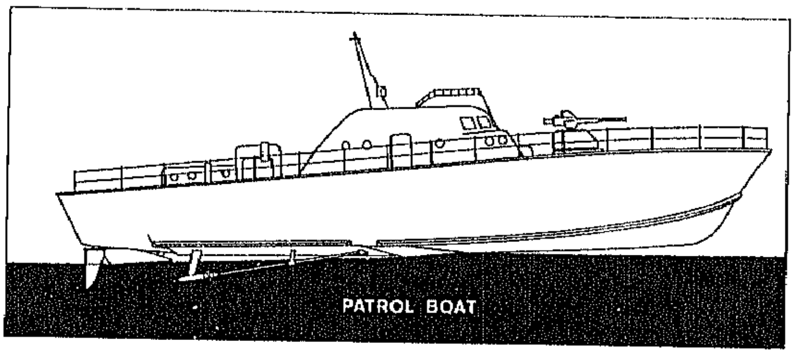


Figure 2.

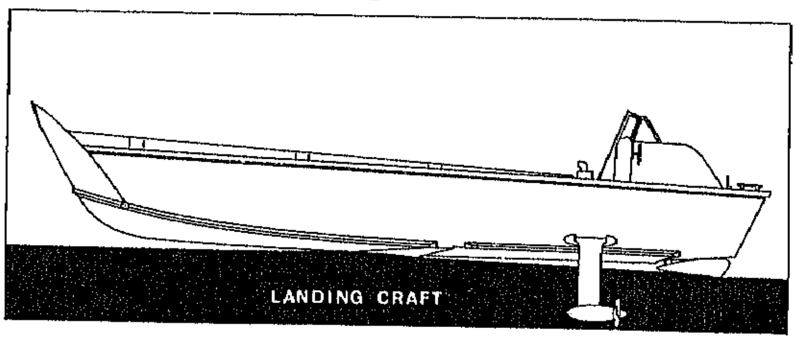


Figure 3.

Calendar of Events

Nov. 13-15: Public Relations Society of America 20th National Conference, Bellevue-Stratford Hotel, Philadelphia, Pa.

Nov. 14-16: American Society of Tool and Manufacturing Engineers Regional Exposition, Sheraton-Boston Hotel and War Memorial Auditorium, Boston, Mass.

Nov. 14-16: Joint Computer Conference, Anaheim, Calif.

Nov. 15-16: Institute of Navigation National Air Meeting, Seattle, Wash.

Nov. 28-Dec. 1: Wire and Cable Symposium, Atlantic City, N.J.

Dec. 3-9: Harvard College Advance Management Program, Statler-Hilton Hotel, Boston, Mass.

Dec. 4-6: American Institute of Aeronautics and Astronautics Missile Systems Meeting, Monterey, Calif.

Dec. 4-6: AFL-CIO Biennial Convention, Americana Hotel, Miami, Fla.

Dec. 5: Armed Forces Management Assn. Luncheon Meeting, Officers Club, Fort Leslie J. McNair, Washington, D.C.

Dec. 5-9: American Nuclear Society Meeting, Chicago, Ill.

Dec. 6-7: Project ARISTOTLE Conference, Washington, D.C.

Dec. 6-8: National Assn. of Manufacturers—72nd Congress of American Industry, Waldorf-Astoria Hotel, New York, N.Y.

Dec. 7-15: AFL-CIO Biennial Convention, Americana Hotel, Miami, Fla.

Dec. 14: Wright Memorial Dinner, Sheraton-Park Hotel, Washington, D.C.

Dec. 26-31: American Assn. for Advancement of Science Meeting, New York, N.Y.

Dec. 27-29: American Economic Assn. Meeting, Washington, D.C.

Dec. 27-30: American Statistical Assn. Meeting, Washington, D.C.

Jan. 4: Armed Forces Management Assn. Luncheon Meeting, Officers Club, Fort Leslie J. McNair, Washington, D.C.

Jan. 7-12: American Chemical Society Meeting, New Orleans, La.

Jan. 22-24: American Institute of Aeronautics and Astronautics Sixth Aerospace Sciences Meeting, New York, N.Y.

Industrial Security Excellence Cited

The 1967 winners of the annual James S. Cogswell awards for superior performance in carrying out security obligations in performance of classified defense contracts have been announced by the Defense Supply Agency.

Two types of awards will be made: plaques for outstanding performances and certificates for excellence. Fifteen plaques and 23 certificates are to be awarded.

Outstanding performance plaques will go to:

AeroJet General Corp., Sacramento, Calif.; Arde Research Corp., Santa Ana, Calif.; Bell Aerospace Corp., Aerosystems Div., Tucson, Ariz.; The Boeing Co., Seattle, Wash.; Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.; Delta Microfilm Co., Los Angeles, Calif.; Electronic Communications, Inc., St. Petersburg, Fla.; Fairchild Camera & Instrument Corp., Syosset, N.Y.; General Dynamics Corp., Fort Worth, Tex.; General Electric Co., Apollo Support Div., Daytona Beach, Fla.; Lockheed Missiles & Space Co., Sunnyvale, Calif.; Lovelace Foundation for Medical Research & Education, Albuquerque, N.M.; Low & Associates, Minneapolis, Minn.; North American Aviation, Inc., Rocketdyne Div., McGregor, Tex.; and Sylvania Electronics Products, Needham, Mass.

Certificates of excellence will be presented to:

American Telephone & Telegraph Co., Long Lines Dept., New York, N.Y.; American Telephone & Telegraph Co., Long Lines Switching Center, Wayne, Pa.; AVCO Corp., Electronics Div., Evendale, Ohio; Bendix Corp., Towson, Md.; The Boeing Co., Wichita, Kan.; Collins Radio Co., Cedar Rapids, Iowa; General Aniline & Film Corp., Dyestuffs & Chemical Div., Central Research Laboratory, Easton, Pa.; General Precision, Inc., Aerospace Group, Little Falls, N.J.

Harvey Aluminum Sales, Defense Plants Div., Milan, Tenn.; Hayes International Corp., Birmingham, Ala.; Mine Safety Appliances Co.; Pittsburgh, Pa.; North American Aviation, Autonetics, Div., Tampa, Fla.; North American Aviation, Space & Information Systems Div., Tulsa, Okla.; North American Aviation, Los Angeles, Calif.; Philco-Ford Corp., Aer tronic Div. & Space Re-entry Syst Div., Newport Beach, Calif.; RCA fense Electronics Products, York, N.Y.

S-F-D Laboratories, Union, N Southwestern Bell Telephone Co., Louis, Mo.; Teledyne Industries, Geotech Div., Garland, Tex.; Uni Aircraft Corp., Pratt and Whitn West Palm Beach, Fla.; Westingho Electric Corp., Defense & Space C ter, Baltimore, Md.; Westingho Electric Corp., Aerospace Electri Div., Lima, Ohio, and Wolf Resear & Development Corp., West Conc Mass.

The award is named in honor Colonel James S. Cogswell, USA (Ret.), first chief of a centraliz office of industrial security, esta lished under the Deputy Director f Defense Contract Administration Ser ices of the Defense Supply Agen in January 1965.

Two Generators Earmarked for Procurement by Army

Two general purpose generato sets, developed by the U.S. Arm Mobility Equipment Command's En gineer Research and Development Laboratories, Fort Belvoir, Va., hav been earmarked for military pro curement as the [illegible].

The sets are five and 10 kilowatt, 6 cycle, AC, 120/208 volt, three phase four wire reconnectable to 120 volt three phase, three wire; 120 volt singl phase, or 240 volt, single phase. They are members of a family that in cludes the one-half, one and one-half and three kilowatt sets which are al driven by military standard gasolin engines.

All sets are self-contained, air cooled and lightweight. Through maximum standardization, they feature a high degree of parts interchangeability, plus performance and reliability never achieved with their commercial predecessors. Designs are completely owned by the Government.

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Cameron Station
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Others may purchase these documents at the price indicated from:

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Springfield, Va. 22151

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Trade Designations of Plastics and Related Materials. Picatinny Arsenal, Dover, N.J., Dec. 1965, 198 p. Order No. AD-481 788. $3.

Studies on the High Temperature Oxidation of Molybdenum, Tungsten, Niobium, Tantalum, Titanium, and Zirconium. Westinghouse Electric Corp., Pittsburgh, Pa., for the Army, April 1967, 69 p. Order No. AD-650 638. $3.

Diffusion Bonding of Titanium Alloys. Atomics International, Canoga Park, Calif., for the Army, Sept. 1966, 29 p. Order No. AD-647 849. $3.

The Plastic Deformation of Magnesium. University of Michigan, for the Army, Feb. 1967, 102 p. Order No. AD-650 746. $3.

Torque Test for Evaluating the Quality of Aluminum Alloy Melts. Frankford Arsenal, Philadelphia, Pa., Dec. 1966, 40 p. Order No. AD-648 486. $3.

Oxidation of Nickel and Nickel-Cobalt Dispersion Strengthened Alloys. Watervliet Arsenal, N.Y., March 1966, 37 p. Order No. AD-482 101. $3.

A Diffusion Bonding Program. Honeywell, Inc., for the Air Force, April 1967, 51 p. Order No. AD-651 545. $3.

DEFENSE PROCUREMENT CIRCULARS

Distribution of Defense Procurement Circulars is made automatically by the U.S. Government Printing Office to subscribers of the Armed Services Procurement Regulation (ASPR).

Defense Procurement Circular No. 55, Sept. 28, 1967. (1) Contractor Submissions of Cost or Pricing Data. (2) Addition to ASPR Manual for Contract Pricing. (3) Shipment from the United States for Overseas Delivery. (4) Value Engineering. (5) Small Business Size Standards. 6) ASPR Section XXI, Parts 1 and 2. (7) Ceiling for Progress Payments on Incentive Contracts.

ABOUT PEOPLE

DEPARTMENT OF DEFENSE

Appointment of Maj. Gen. William H. Prentice, USAR, to a three-year term as a member of the Reserve Forces Policy Board has been announced.

RAdm. William E. Kuntz, USN, has been assigned as Asst. Dep. Dir., Defense Communications Systems Operations, Defense Communications Agency. He succeeds RAdm. John R. Wadleigh, USN.

Brig. Gen. I. R. Obenchain Jr., USA, has been assigned as Asst. Dep. Manager, National Communications System, Defense Communications Agency.

Col. Jean E. Crabtree, USAF, has succeeded Capt. E. E. Johnson, USN, as Staff Director of Installations and Services, Headquarters, Defense Supply Agency.

Col. Hugh B. Mitchell, USAF, has relieved Capt. Joseph S. Burkle, USN, as Dir., Armed Forces Radiobiology Research Institute, Bethesda, Md.

DEPARTMENT OF THE ARMY

Brig. Gen. Wendell J. Coats has been appointed Dep. Chief of Information, Office of the Chief of Information. He succeeds Brig. Gen. Lloyd B. Ramsey who has served as Dep. Chief since March 1966.

Col. Paul R. Cerar has succeeded Brig. Gen. William W. Stone Jr., as Commander of Edgewood Arsenal, Md.

Dr. Charles A. Reynolds, professor of chemistry at the University of Kansas, has been named as Edgewood Arsenal's first Technical Director.

Col. Edward G. Anderson Jr. has assumed duties as Commanding Officer, U.S. Army Engineer Topographic Laboratories, Fort Belvoir, Va. He succeeds Col. H. W. Fish, who has retired.

Col. John R. M. Covert has been selected the Project Manager for the Army's Redeye guided missile system at Redstone Arsenal, Ala.

DEPARTMENT OF THE NAVY

RAdm. Ernest W. Dobie Jr., has been assigned as Dep. Dir., Anti-Submarine Warfare Programs, Office of the Chief of Naval Operations. Relieving Adm. Dobie as Dir., Undersea Warfare and Ocean Surveillance Div., Office of the Chief of Naval Operations, will be Capt. Parker B. Armstrong, who has been selected for promotion to the rank of rear admiral.

RAdm. Allan F. Fleming has been named Asst. Dep. Chief of Naval Operations (Plans and Policy).

RAdm. Vincent P. De Poix has been named Asst. Dep. Chief of Naval Operations (Development).

RAdm. John W. Dolan Jr., Commander of Long Beach Naval Shipyard, Long Beach, Calif., since December 1965, has been relieved by Capt. C. Monroe Hart. Capt. Hart comes to the new post from duty as Industrial Control Officer, San Francisco Bay Naval Shipyard, Mare Island Div.

Capt. Colin J. Ricketts has assumed command of the Naval Missile Center, Point Mugu, Calif., relieving Capt. Carl O. Holmquist.

DEPARTMENT OF THE AIR FORCE

Thomas H. Nielsen has been nominated by President Johnson to succeed Leonard Marks Jr. as Asst. Secretary of the Air Force (Financial Management).

Maj. Gen. Ernest A. Pinson has been selected to serve as Commandant of the Air University's Air Force Institute of Technology, Wright-Patterson AFB, Ohio. He takes command on Nov. 1.

Maj. Gen. Lawrence F. Tanberg has been named Dir. of Maintenance Engineering, Office of the Dep. Chief of Staff (Systems and Logistics), at USAF headquarters.

Maj. Gen. John L. McCoy has been reassigned as Dir. of Plans and Programs, Air Force Logistics Command, Wright-Patterson AFB, Ohio.

Brig. Gen. Franklin A. Nichols has been named Commander, Ground Electronics Engineering Installation Agency, Air Force Logistics Command, Griffiss AFB, N.Y.

Brig. Gen. William F. Pitts has been ordered to duty at USAF headquarters to serve as Dep. Dir. of Budget, Office of the Comptroller of the Air Force.

Col. Clyde S. Cherry has assumed duties as Dir. of Systems Test, Air Force Flight Test Center, Edwards AFB, Calif.

Col. Martin K. Newland has been assigned as Chief of the Minuteman Missile Division, Materiel Management Directorate, at Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

Col. Walter K. Rickert has become Dir. of Nuclear Field Operations, at Kirtland AFB, N.M. He relieved Col. James T. Corn, who has gone to AFSC headquarters to serve as Dep. Dir., Test Operations, in the Office of the Dep. Chief of Staff (Operations).

Col. William A. Walker has been named Chief, Propulsion Subsystems Div., Dep. for Subsystems and Equipment Management, Aeronautical Systems, Div., (AFSC), Wright-Patterson AFB, Ohio. He succeeded Col. Hal W. Everett, who has retired.

SPCC Given Role in Navy's Deep Submergence Program

The Ships Parts Control Center (SPCC), Mechanicsburg, Pa., will play an important role in one of the Navy's newest programs—the Deep Submergence Systems Program (DSSP)—which is designed to meet the Navy's increasing need for oceanographic research.

Acting through the Special Projects Office, the Program Branch, Weapons Systems Coordination Division, of the center will work with DSSP to ensure that equipment installed in newly developed oceanography vehicles is backed up by adequate spare and repair parts.

Part of the SPCC mission will be to assist DSSP in identifying the different kinds of parts required, deciding how many of each are needed, and compiling information for inclusion in catalog and allowance lists.

Preparation of instructions governing the delivery of support items and formalization of contracts for the procurement of spare and repair parts and special tools will also be SPCC's responsibility.

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SPECIAL ASSISTANT TO DIRECTOR
MAJ Donald E. Burggrabe 4D 922 59156

DIRECT
MAJ GEN William

DEPUTY DIR
BRIG GEN James F.

ASSISTANT DIRECTOR
COL Mark H. Gilman 4D 922 74259

LT COL Donald L.

e of Information is located
e Pentagon, Washington, D. C.
hone: Area Code 202, OXford plus number listed.

COMMUNITY RELATIONS DIVISION
COL Gerald R. Jorgensen
4A 120 74008
DEPUTY CHIEF
COL David B. O'Hara
4A 120 75117

SPECIAL EVENTS BRANCH
LT COL Gaylord A. Knapp
4A 120 75226

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4A 120 76629

CIVIL BRANCH
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4A 120 79079

SPEAKERS BRANCH
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4A 120 72769

BANDS BRANCH
CWO Loy A. Ebersole
4A 120 52783

INTERNAL INFORMATION DIVISION
COL Bishop M. Kilgore
5C 941 77264
DEPUTY CHIEF
COL Leo I. Beinhorn
5C 941 77264

ASSISTANT FOR POLICY AND PROGRAMS
MR Francis W. Jennings
5C 941 78275

INTERNAL PROJECTS BRANCH
MAJ Vincent R. Tocci
5C 941 77773

AFRTS
MAJ Jordan E. Rizer
5C 941 78569

INTERNAL MEDIA BRANCH
MAJ James A. McDonnell, Jr.
5C 941 74100

COMMAND SERVICES UNIT
LT COL Thomas E. Bowers
Bolling AFB D. C. 61137

PLANS AND P
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DEP
LT COL W
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SPACE-SUPPORT
MAJ John
5C 9

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COMMUNICATIO
COL Ralph
Bolling AF
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November 1967

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FORMATION
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F INFORMATION
Jr. 4D 922 73329

ASSISTANT DIRECTOR
COL Max B. Boyd 4D 922 54602

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MS DIVISION
Martin
9657

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Leyser
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O'Leary
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ne, Jr.
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PUBLIC INFORMATION DIVISION
COL Herbert L. Wurth
4C 922 55554
DEPUTY CHIEF
LT COL Milton K. Kegley
4C 922 73328

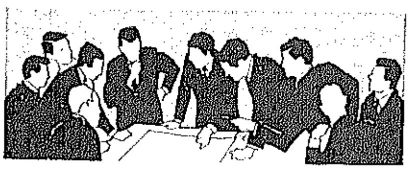
OPERATIONS BRANCH
LT COL Harold A. Susskind
4C 922 55809
PROJECTS DEVELOPMENT BRANCH
LT COL Carl G. Arnold
4C 922 77817

MID-WEST OFC OF INFO
COL Ralph R. Springer
219 S. Dearborn
Chicago, Ill. 60604
(312) 353-5151

LOS ANGELES OFC OF INFO
COL George Schenkein
6087 Sunset Blvd.
Hollywood, Calif. 90028
(213) 688-2579

NEW YORK OFC OF INFO
COL C. B. Whitehead
633 5th Ave.
New York, N.Y. 10022
(212) 753-5609

OFFICE FOR SECURITY REVIEW
MR Flint O. DuPre
5C-924 73222
DEPUTY CHIEF
LT COL Nicholas J. Kasun, Jr.
5C 924 79542



MEETINGS AND SYMPOSIA

NOVEMBER

1967 Conference on Speech Communication and Processing, Nov. 6-8, at Boston, Mass. Co-sponsors: Air Force Cambridge Research Laboratories and the Institute of Electrical and Electronics Engineers. Contact: C. P. Smith, (CRBS), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01730, Phone (617) 274-6100, Ext. 3712.

Applied Superconductivity Conference, Nov. 6-8, at Austin, Tex. Sponsors: Army Research Office, University of Texas, NASA, Air Force Office of Scientific Research and the Office of Naval Research. Contact: W. H. Hartwig, Electronic Materials Research Laboratory, University of Texas, Austin, Tex. 78712; or Lt. Col. R. B. Kalisch, (SREE), Air Force Office of Scientific Research, 1400 Wilson Blvd., Arlington, Va. 22209, Phone (202) OXford 4-5518.

Tenth Navy-Industry Conference on Systems Effectiveness, Nov. 8-9, at Washington, D.C. Sponsor: Naval Air Systems Command. Contact: Executive Secretary, Naval Air Systems Effectiveness Advisory Board, Code AIR-5205A, Naval Air Systems Command, Washington, D.C. 20360, Phone (202) OXford 6-5284.

Navy Electronic Systems Classified Briefing (Secret), Nov. 14-16, at the U.S. Navy Amphibious Base, Coronado, Calif. Sponsor: Electronic Industries Assn. Contact: Electronic Industries Assn., 2001 Eye St., NW, Washington, D.C. 20006, Phone (202) 659-2200.

Decomposition of Organo Metallic Compounds to Refractory Ceramics Metals and Metal Alloys Conference, Nov. 28-30, at the Sheraton-Dayton Hotel, Dayton, Ohio. Sponsor: Air [illegible] Symposium, Nov. 29-Dec. 1, at the Shelburne Hotel, Atlantic City, N.J. Sponsor: Army Electronics Command. Contact: Milton Tenzer, Electronic Parts and Materials Div., Electronic Component Lab., Army Electronics Command, Fort Monmouth, N.J. 07703, Phone (201) 535-1834.

DECEMBER

Theory of **Measurement of Atmospheric Turbulence** Conference, Dec. 5-7, at Sandia Base, Albuquerque, N.M. Co-sponsors: Army Electronics Command and Sandia Corp. Contact: Marvin Diamond, Atmospheric Sciences Office, Atmospheric Sciences Laboratory, Army Electronics Command, White Sands Missile Range, N.M. 88002, Phone (505) 338-1006.

Industry-Defense Meeting, "**Industry Responds to National Emergency**," Dec. 7, at the Waldorf-Astoria Hotel, New York, N.Y. Co-sponsors: American Ordnance Assn., Eastern and Northeast Chapters. Contact: John S. Pink, American Ordnance Assn., 207 W. 24th St., New York, N.Y. 10011, Phone (212) OR 7-3030, Ext. 700.

JANUARY

Seminar on **Strain Gage Techniques**, Jan. 8-12, 1968, at the University of Miami, Coral Gables, Fla. Sponsors: Mechanical Engineering Department of the School of Engineering and the Division of Continuing Education, University of Miami and the Society for Experimental Stress Analysis. Contact: Director, Professional Education, Division of Continuing Education, P.O. Box 8005, University of Miami, Coral Gables, Fla. 33124.

Conference on **Methodologies of Pattern Recognition**, Jan. 24-26, 1968, at the University of Hawaii, Honolulu, Hawaii. Sponsor: Office of Aerospace Research. Contact: Mrs. R. W. Swanson, Air Force Office of Scientific Research, (SRI), 1400 Wilson Blvd., Arlington, Va. 22209, Phone (202) OX 4-5407.

Army Security Film Available

"The Smile and the Sword," the ninth in a series of industrial security films, has been distributed to U.S. Army Audio-Visual Support Centers for redistribution on a loan basis.

The 20-minute, black and white film (DODIS-9) is based on J. Edgar Hoover's article, "The American Businessman Faces the Soviet Spy," which appeared in the Harvard Business Review. The picture portrays a for- [illegible] ttempts to dupe an [illegible] sman into an espi- [illegible]

[illegible] e Smile and the [illegible] submitted to the [illegible] ny Audio-Visual Support Center, at any of the following addresses:

Fort George G. Meade, Md. 20755

Frankford Arsenal, Philadelphia, Pa. 19137

Sixth Army, Presidio of San Francisco, Calif. 92129

Fort Wadsworth, N.Y. 11252

Fort McPherson, Atlanta, Ga. 30330

Fort Sheridan, Ill. 60038

St. Louis Area Support Center, 12th & Spruce St., St. Louis, Mo. 63103

U.S. Army Tank Automotive Command, Warren, Mich. 48090

Fort Sam Houston, San Antonio, Tex. 78234

Army Support Detachment, Oakdale, Pa. 15071

Fort MacArthur, Calif. 90731

ASPR Committee Case Listing

The following is a listing (revised as of Aug. 29, 1967) of the cases currently under consideration by the Armed Services Procurement Regulation (ASPR) Committee, of the Office of the Assistant Secretary of Defense (Installations and Logistics).

On items marked by asterisks, the text has been omitted to shorten the listing. The asterisks denote actions taken as shown below:

**—Case closed, no ASPR revisions resulting.*

***—Case closed, approved for printing in a subsequent ASPR revision.*

****—Case closed, approved for printing subject to further government coordination.*

The listing includes subjects of interest to contractors but excludes cases of a minor or editorial nature, those considered sensitive, and those involving a deviation from the regulation which are processed by the ASPR Committee.

The ASPR Committee meets with representatives of major industry associations periodically to explain the purpose and status of each of the cases under consideration, and to answer questions from industry representatives concerning the cases. All proposed ASPR changes of major policy are forwarded to industry associations in draft form for the review and comments of the association memberships. Industry comments are evaluated by the Defense Department before a final decision on the proposal is made by the ASPR Committee.

Industrial Equipment Modernization and Replacement Program. To consider developing a contractual requirement for the determination of savings resulting from the DOD industrial equipment modernization or replacement programs for inclusion in the ASPR. Proposed ASPR text and a contract clause for use in fixed-price contracts to accomplish the foregoing have been developed and commented on by industry. Revised coverage, based on review of industry comments, has been prepared. The question of establishment of a "dollar floor" below which the facilities acquisition clause would not be used is still under consideration.

* **DOD Ship Repair Contract Manual.**

** **DOD Policy on Furnishing Components, Subsystems, etc., to Contractors.**

Rental Charges for Use of Government Property. To consider whether the adoption of a policy of charging rent for use of government property, across the board, would be more practical and less burdensome in assuring against competitive advantages, and would result in a decline in the number of requests for use of government property generally. No definitive action has been taken on the numerous proposed solutions to this matter. The problem is still under consideration.

** **Value Engineering—Incorporation of Defense Procurement Circulars No. 11 and No. 19 in the ASPR.**

** **Air Force Procurement Circular No. 6.**

Industry Cost Sharing. To consider revising the ASPR policy contained in 4-208, on industry cost sharing in connection with sales to foreign governments, to provide additional policy guidance for use in situations when the potential domestic and foreign commercial sales of the contractor appear to be very substantial and provisions for cost recovery of development expenses by the Government may be appropriate.

* **DOD Contract Clause Book.**

Cost Principle—Depreciation. To review the depreciation guidelines and rules, issued by new Revenue Procedures 65-13, and to prepare appropriate changes to ASPR 15-205.9 which may be necessary as a result of Revenue Procedures 65-13, issued by the Internal Revenue Service. A subcommittee report, after considering industry comments, has been considered and returned to the subcommittee for further redrafting. A revised subcommittee report has been received and will be considered in the near future.

** **Proposed Addition to ASPR on Procurement of Privately Developed Items.**

Environmental Pollution Control. To consider the development of contractual coverage to implement Executive Order 11258 with respect to prevention, control and abatement of water pollution by Federal activities, and to assure that the standards established for direct Federal operations are adhered to by contractors under programs financed by the Government. This matter is still under consideration by the subcommittee in conjunction with other government agencies.

Patent Costs. To consider the recommendations of the Defense Industry Advisory Council Working Group that ASPR 15-205.26, covering patent costs, be clarified in view of the varying interpretations of the present cost principles. A proposed revision of the patent cost principle was forwarded to industry for comment of March 6, 1967. Industry comments have been received and considered. A revised subcommittee report, based upon the comments received from industry, has been presented. This matter will be considered by the ASPR Committee in the near future.

Source Selection Procedures. To consider the development of coverage for inclusion in the ASPR with respect to the selection of sources, both in research and development contracts and in production contracts which are not awarded on the basis of price competition.

Equal Employment Opportunity. To develop implementation of the Department of Labor proposed revised rules with respect to the subject matter. This matter is currently under consideration by a special subcommittee.

* **Paperwork Burden on Defense Contractors.**

Review of the Implementation of Public Law 87-653. To undertake a review of the ASPR implementation of Public Law 87-653 in depth, on the basis of the experience thus far obtained, to determine the need for further guidance or clarification of such covrage. This review has been divided into five broad areas as follows:

- **The submission of data.** When is data submitted? Submission vs. disclosure or availability. Identification of data. Contracting officer (and other) documentation.
- **Definitions of "current" and "complete."** From the standpoint of

reasonableness and practicability. How should significance be considered?

- **Examination of Records.** Audit before negotiation. Audit after contract award. Audit of subcontractor data.
- **Subcontract Problems.** Subcontracts under firm fixed-price primes. Second and third tier subcontracts.
- **Significance.** From the standpoint of price negotiation vs. application of defective pricing clause. Price changes after price agreement but before contract award.

As a result of the comments previously received from industry, the committee has completed its efforts in revising the clauses implementing Public Law 87-653. However, because of the foregoing review, publication of the clause changes is being withheld. The material developed under this matter was forwarded to industry for comment on June 9. The comments received are currently under consideration.

Relocation Costs, ASPR 15-205.25. To consider revising ASPR 15-205.25, covering relocation costs, to specifically set forth therein guidance to government auditors and contracting officials in the treatment to be afforded the cost of maintaining unsold homes of contractors' employees, who transfer to new locations to work under government contracts. Industry comments on the proposed clarification have been received and are being considered.

Cost Information Reports (CIR). To develop appropriate implementation of Cost Information Reports, covered in DOD Directive 7041.2, entitled "Cost Information Reports," and the DOD Handbook entitled, "Cost Information Reports (CIR) for Aircraft, Missiles and Space Systems," for inclusions in the ASPR. An initial draft of ASPR coverage was considered early in July and returned to the subcommittee offices. Consideration of this case continues with publication expected early in calendar year 1968.

Handbook for Procurement Quality Assurance. To prepare an ASPR supplement which will provide standardized procedures, when possible, for use of government inspection and quality assurance personnel. The case has been returned to the subcommittee for further development.

Contractor Utilization of Industrial Production Equipment. To prepare procedures which will require an active government program to assure that government-furnished industrial production equipment in possession of contractors is being effectively utilized. Industry comments on the draft of the proposed part are being evaluated.

Production Surveillance and Reporting. To prepare the initial parts of a new ASPR section dealing with the production function. This effort is confined to the activities of government personnel in determining the status of progress on government contracts and the reporting of the status, as required. A revised subcommitee report is being evaluated.

Transportation. To develop a new ASPR Section XIX, covering transportation, by expanding the existing Section I, Part 13, coverage to incorporate therein existing service material and, thereby, provide comprehensive guidance, including necessary contract clauses and provisions. Industry comments have been evaluated and publication is expected shortly.

** **Public Law 89-487—Freedom of Information.**

** **Organizational Conflict of Interest.**

Health and Safety Clauses. To develop uniform health and safety clauses for inclusion in the ASPR, with a view to recession of the existing departmental safety and accident ment of uniform ASPR coverage which would permit deletion of existing departmental coverage with respect to procurement of communication services from both regulated and non-regulated suppliers. Industry comments have been received, considered, and revised coverage developed. The coverage will be considered by the committee in the near future.

* **Consideration of NASA Instant Licensing Procedures.**

Cost-Plus-Award Fee Contracts. To determine whether cost-plus-award fee contracts, for use in situations requiring a level of effort (by excluding contracts for hardware development), should be set forth in the ASPR as an authorized type of contract. This matter is still under consideration.

Advance Understanding of Allowability, ASPR 15-107. To revise the existing ASPR paragraph to explicitly provide that such agreements must be in writing to be binding on the Government. This subject is still in the process of being developed.

* **Minimum Discount Period for Bid Evaluation.**

Disposition of Contractor Inventory. To develop a new ASPR Section XXIV providing procedures for disposal of excess government property in possession of contractors. Industry comments on the proposed section have been evaluated and publication is expected shortly.

Compensation Review. To determine what actions on the part of the Government are necessary to assure that compensation paid to contractor employees performing on government contracts is reasonable. This case is presently being considered by a CAP Subcommittee.

DOD Policy on "Buying In." To revise the existing policy statement on "buying in," contained in ASPR 1-311, to clarify the basic policy statement by appropriate cross reference to the

FROM THE SPEAKERS ROSTRUM

Address by Hon. Thomas E. Morris, Asst. Secretary of Defense (Installations and Logistics), at the DOD Value Engineering In-House Conference, Washington, D. C., Sept. 12, 1967.

Value Engineering Can Solve Cost Problems

. . . My fundamental responsibility as the Assistant Secretary of Defense (Installations and Logistics) is to see that our combat forces receive the materiel support they need. The vital significance of our responsibility to provide materiel support to our combat forces comes into sharper focus when we are committed in actual combat, as is the case in Vietnam today. Materiel support must satisfy certain basic criteria:

- Materiel must satisfy all aspects of military operation requirements.
- Materiel must meet required standards of quality and reliability.
- Materiel must be delivered to the place of need, at the time of need, and in the required quantities.

The extended period of cold and hot war that we have encountered since World War II illuminates another important responsibility that we share. This responsibility is to provide the materiel support to our forces at the lowest possible cost of effective ownership. By "lowest cost of effective ownership" I don't necessarily mean lowest initial cost, but a lower overall cost of acquiring, operating and supporting weapons and equipment over their useful life. The President and the Secretary of Defense insist that we obtain value from our defense budget. The Congress keeps a close eye on our efforts in this regard. And, finally, we owe it to the nation and to ourselves as taxpayers to get the most out of the resources placed under our stewardship.

Often it is said that cost effectiveness is just routine good management. The inference is that if we concentrate on meeting specification requirements and delivery schedules, optimum costs will automatically result. Experience proves that this rationalization does not tell the whole story. We must also have an organized and disciplined procedure, designed to assure that we are cost effective in meeting performance and schedule requirements. Management emphasis on achieving valid performance requirements and meeting schedules must continue. We must also assure a third area of management emphasis—we must assure that we have an effective overt effort which is designed and implemented to assure that performance and schedule requirements are met at the lowest possible cost for acquisition, operation and support.

The purpose of the Cost Reduction Program is to achieve economy in managing the expenditures and resources of the Defense Department. This program establishes cost reduction goals, measures performance against these goals and, thus, provides a broad measure of our cost effectiveness. As a motivational program, strongly emphasized by the highest levels in DOD, and by the President himself, the Cost Reduction Program assures that the economic aspects of our management task receive widespread attention.

The Value Engineering Program supplements the Cost Reduction Program. Value engineering provides an organized, conscious and formally identified effort for managers to use on a continuing basis. It is a discipline particularly suitable for continuing use at the operating level. It is a value management technique for use in project offices, buying divisions, logistic support management divisions, and in the functions that contribute to these management efforts. Value engineering is akin to scientific problem-solving techniques which have proven successful in solving military problems and hardware design problems.

Hon. Thomas E. Morris

Value engineering—or value analysis, if you wish—has these distinctive features:

- It doesn't ask a design engineer to sacrifice valid performance requirements.
- It doesn't ask the logisticians to sacrifice valid supportability, maintainability, or transportability features.
- It maintains or improves safety, quality and reliability requirements.

We have seen enough results to know that value engineering can successfully solve cost problems. Significant value engineering savings have been realized in all phases of our projects from beginning to end—from ammunition to paperwork, from missile and space projects to repair procedures on equipment that has been in the inventory for 10 or more years.

Here are three relatively simple and handy examples of value engineering improvements. These examples have the added virtue of illustrating that value engineering may improve items supplied to our combat forces in Vietnam as well as decreasing their cost.

- A value engineered design change of the motor case of an aircraft rocket eliminated three component parts. This value improvement also improved by 40 percent the reliability of this high usage rate rocket. Safety and producibility characteristics were improved. This value engineering action reduced the unit cost of the rocket motor by over 30 percent.

• A value engineering project on the anti-personnel bomblet developed several design changes that can be made to reduce its cost. These changes will not impair the function of the item. This crimp bank is now being cut from standard steel tubing. Before it was a specially formed part. This small value engineering change alone will save over $1 million.

• The next example is a value engineering action on the universal rifle case. Formerly, the universal rifle case was a zippered bag used to retain a rifle on a service vehicle. The value engineering action substituted a bracket at a lower cost. The action resulted in savings of $551 thousand as well as provided quicker access to the weapon.

Many value engineering illustrations could be cited which save money, meet operational needs, and improve other characteristics such as reliability, producibility and safety. These successful value engineering actions are considered by many to be just good common sense. I agree that they are good common sense. We need more of it. Value engineering is a systematic technique to apply common sense to get the function satisfied at lower cost and, as experience shows, usually it improves other characteristics also.

The most significant thing about these three examples is that the value engineering effort was made. Someone actively sought a way to satisfy a requirement at a lower cost. Having actively sought a way to do the job at a lower cost, they found it, and also found ways to improve other aspects of their management task.

More Effort Needed in VECP Activity

Unfortunately, value engineering change proposal (VECP) data indicates that an effective value engineering effort is not being made on some of our programs. A recent review of the VECP activity of 34 of our largest defense contractors shows considerable disparity. Eight of the 34 didn't submit a single high dollar VECP (estimated value of $50,000 or more before sharing). Substantial results, however, were produced by several of these contractors. For example, eight of the 34 each produced estimated savings to DOD of over $1 million from approved VECPs. The VECP savings to us from each of these eight contractors ranged from $1 million to $5 million.

Incidentally the contractor that produced $5 million in VECP savings to DOD, last year had less sales to DOD than 15 or so other contractors. The dollar value of his contracts with the Army, Navy and Air Force in FY 1966 was approximately one-tenth that of the contractors cited earlier, who didn't produce a single successful high dollar VECP.

I don't infer that the larger contractors are not active in value engineering. In fact, some of our largest contractors are among these eight producing VECP savings to DOD of over a million dollars.

The findings of the Logistics Management Institute survey, analysis of VECP data, and other information lead to a conclusion that value engineering is not being effectively used on some programs. Why is this so?

Probably a number of reasons—or excuses—could be given. Substantial evidence indicates that some of our principal managers have not included value engineering as an integral part of their responsibility. Furthermore, the attention given to value engineering by principals in DOD rubs off on counterparts in industry. One of Webster's definitions of "principal" is "the person primarily responsible for an obligation." I am using "principal" to describe the program manager, the engineer, the project officer, the procurement officer, the maintenance technician, the supply technician, etc. —those who have a direct contributing task in the acquisition and support of DOD materiel.

Some of these principals and their counterparts in industry may have tended to think of value engineering as being solely in the purview of a special functionary. This special functionary, the Value Engineering Office, Value Analysis Office, or Value Control Office—whatever the title—may even be considered by some to be a meddlesome burden whose sole reason for being is to satisfy the whims of Washington. Fortunately, there is evidence that this extreme may be on the wane. The greatest progress appears to have been made in those programs and activities where the principals on the DOD side of the house have become informed on the DOD Value Engineering Program, have visualized its potential, and have assimilated value engineering into their job responsibilities.

We have noted the initiative taken by the Departments of the Army, Navy and Air Force, and the Defense Supply Agency, at the Washington level, to spur the value engineering accomplishments in their Departments. We have observed that these initiatives have achieved noteworthy results. But we have also learned that all principals in program offices and buying activities have not received these "transmissions" or, if received, have not interpreted them to be of continuing concern. There may have been an inclination on the part of some to consider them an annual drive that can be forgotten until next year.

At the more favorable end of the spectrum we have learned of a case where program office personnel have exercised initiative to establish communication, understanding and a healthy rapport within the Department and with contractors, specifically on the administration of the Value Engineering Program on their contracts. We would like to learn of more and more examples where our managers are including value engineering as a normal part of their management process; that more and more productive value engineering efforts are being made by the DOD component activities and by their contractors.

What is the Job of the Value Engineer?

I have stressed the importance of principals becoming personally involved in the Value Engineering Program. You may be wondering what is the job of the value engineer—the man occupying a value engineering position? Several years ago we recognized that a small staff should be provided to assist our managers in initiating and sustaining value engineering on their programs and projects. The Secretary of Defense authorized 265 additional manpower spaces for this purpose. After this

augmentation there are still less than 500 full-time value engineering spaces authorized in all of the Army, Navy, Air Force, and the Defense Supply Agency.

Let me emphasize that it is our intent that these value engineers be used to assist the principals to sustain a productive value engineering effort. They are provided to give the managers someone to guide and coordinate the effort of the principals concerned in finding better cost solutions, and assist them in their effort to be more cost effective managers. This value engineering capability is provided as a catalyst to speed the realization of better cost solutions. The value engineer is not just a convenient pair of shoulders to accept the "cost effective element" of the principal's management responsibility. If we endorsed a concept of establishing the value engineering organization to be responsible for the value of the job, we would, among other disadvantages, divide responsibility and duplicate manning requirements. To expect a value engineering organization to relieve the manager of his responsibility for cost effective management is just not logical nor practical. In the past few years I have acquired some appreciation for the DOD manpower picture. I assure you that we cannot afford the luxury of two men to do one man's job. . . .

Most of us recognize that the technological competence and wealth of resources available to our country are unsurpassed in history. An awareness of current events also leads to an inescapable conclusion that our defense programs, non-defense programs, programs to improve the welfare of all our citizens, not to mention the plight of millions of destitute people throughout the world, place huge demands—also unsurpassed in history—on our wealth of resources. If we place these facts in perspective, as they must be at the higher levels of the Government, it quickly becomes apparent that we must strive to get a dollar's worth of value from each dollar expended on our defense programs.

Cost effectiveness, therefore, must be an essential element of our DOD management objectives. I call your attention to the theme of this conference—"How Value Engineering Supports Defense Management Objectives." Value engineering can be an effective tool for us to use to achieve this essential element of our management, the realization of value. The primary motivating force capable of producing the large value improvements that we seek is managers like yourselves, who are implementing policy and making the many decisions required daily throughout this complex Defense Department. It seems almost unnecessary to say that managers in program offices, procurement activities, engineering, logistics, and contract administration must coordinate with each other, and put full weight behind our value program if we are to capture the large potential value engineering savings we see.

I am confident that value engineering will not only continue, but will become more effective in its support of our defense management objectives. The program, of course, requires continuing and able attention from the highly motivated, competent managers that it is our good fortune to have on our defense team.

Address by Lt. Gen. Charles H. Terhune Jr., USAF, Vice Commander, Air Force Systems Command, to the Seminar for Industry, Air Force Assn. Fall Meeting, Sheraton Park Hotel, Washington, D. C., Sept. 13, 1967.

Management Progressiveness

* * * * * * * * * *

It used to be said that all roads lead to Rome. In the development and acquisition business, it is hoped that all roads lead eventually to contracts. We write about 7,000 contracts a year in the Air Force Systems Command (AFSC), take about 17,000 funding actions, and engage in more than 275,000 contractual actions of some description. All of the AFSC responsibilities require some sort of government-industry partnership, usually contractual. The success of this partnership depends in turn on the quality of our management.

Over the years we have talked a great deal about the importance of being progressive in our management policies and procedures. This requirement has not ended, and it never will. However, the issue today is not how much progress we make, but how good that progress is. Like our technical options, our management options have multiplied in recent years. We're surrounded by an abundance of management tools and techniques, all of which have their individual virtues but none of which is suited to every situation.

I don't consider myself a management expert, but after many years in the research and development and systems acquisition business, I do feel I have some management experience. Based on that experience, I'd like to have a few choice words with you today on the nature and direction of our management progressiveness.

The first word is change.

The only thing we can say with absolute certainty about management today is that there are going to be continuing changes. Some of these changes will be functional—we learn how to do things better. However, many others result simply from changing circumstances or changes in the environment in which we operate. Sometimes the manner of doing business changes. We find we must accommodate our management to special objectives and conditions established by higher authority or demanded by national policy. While we've invented or adopted the "ideal" management system many times, we recognize today that no system, no matter how superior, is ever supreme or universally applicable. So in this respect we expect to "stay loose." We're keeping an open mind on management just as we're keeping an open house on technology.

The second word is selectivity.

We can't blame a management system or fault a management technique for failures or deficiencies if we use the wrong one or apply it badly. We have a crying need today to be discriminating, not only in the selection of management processes but in limiting our choices to only what is needed. We can overwhelm a system, and ourselves, through excessive management or through too much management by too many people.

In AFSC, our Management Systems Control Board has taken action

to encourage and support selectivity. One purpose of the board is to insure that no management system is ascribed to a new program arbitrarily or without good cause.

In the past, if a system program director wanted to exempt his program from a directed management system, he had to request a waiver. Under our present approach, the system program office has a direct hand in the selection of the management techniques, and waivers are granted automatically.

The third word in our current management vocabulary is balance.

In recent years, the Air Force has, in effect, co-managed a program with the prime contractor. In many cases we've tried to do a good deal of direct on-the-spot managing. While in certain high-risk programs such joint management practices may persist, there is a growing tendency today toward a new influence—disengagement; disengagement in the sense of dropping many contracting officer or plant representative approval requirements. Air Force item-by-item approval of subcontractors and preliminary and final design reviews are eliminated. We allow the contractor the latitude to run his own business. We advise him of what we need, not how to develop and produce it. This is practical, however, only when we can describe explicitly what the minimum acceptable performance of the system will be. This requires us to do more thorough homework ourselves before we advertise for a new product or capability, and I will touch on the subject later.

I want to be quick to point out that disengagement is not divorce or separation of the Air Force from the contractor without "visiting rights." We must maintain a degree of visibility into the contractor's work—to monitor the progress of the program, to be on the scene in the event changes are required in the contract, and to assure that public funds are being spent wisely. Our goal is a balance between over-control and a complete hands-off attitude. The visibility we seek is intended to fall considerably short of detailed management, microscopic review, or pinpoint control.

Disengagement is possible and visibility of this type is feasible when we can write contracts that are truly definitive, and this is the fourth choice word.

We've rediscovered that when we take the time to define and cost out our requirements, expressing them in terms of performance specifics in a definitive contract, we stand to get better results than when we plunge ahead in a "crash" program framed in rather fuzzy requirements.

In fact, we're mutually better off when we can define what we want in advance. It may take a little longer in the beginning, but generally the long-run result is fewer changes, more realistic schedules, and lower costs over the run of the contract.

The fifth word for the day is inclusiveness, best exemplified in the total package procurement policy.

As you know, total package procurement contracting envisions that all anticipated development, production, and as much of the support for a system as it's possible to define be procured under one contract. This contract contains price and performance commitments obtained during the contract definition phase of a system procurement.

The C-5A program is something of a pioneering effort in the direction of total package procurement. With the C-5A we had a definite contract before a decision had been made on the winner of the competition. We could take this approach because the systems we wanted were identifiable in performance specifics.

Total Package Procurement—Advantages and Disadvantages

Recently, I have read with much interest the findings of the Logistics Management Institute in Washington on total package procurement advantages and disadvantages. Based on my own experience with this method of contracting and the report of the Logistics Management Institute, I'd like to make a few brief observations.

• First, both the Government and the contractor benefit from the kind of long-run program stability and continuity attainable through the total package procurement approach. This is particularly true with regard to planning for funding, personnel, facilities and overhead.

• Second, definitized life-cycle contracting forces the Government and industry to thoroughly study and define a weapon system or other product prior to contract signature. It disciplines subsequent government and industry actions, encouraging each partner to face up to the contract and live with it.

• Third, the total package procurement concept discourages changes. To date we can count on the fingers of one hand the number of C-5A engineering changes which have increased target costs in the two years since contract award. In contrast to this extremely small number, there have been over 500 cost changes in another current acquisition program, not total package procurement, in the same period of time.

• Fourth, total package procurement forces good management planning at the outset. There's no room for any lack of thoroughness or buck-passing, at any level of authority. A total package procurement contract should not be vague or interpretive. Anyone who changes the contract must negotiate the changes in a sole source environment.

• Fifth, and I think this is very important, total package procurement doesn't have to be total. We haven't really had a total package procurement yet, and we may never have one. In the C-5, spares and operation and maintenance costs are handled separately. Still, a major part of the hardware procurement has been brought under a single fixed-price incentive contract.

It is not yet obvious how extensively we should use the total package principle. But what are some of the advantages and disadvantages of total package procurement, so far as we can determine now?

Some of the advantages cited by the Logistics Management Institute survey include cost savings, shorter development schedules, better long-range planning, and earlier initial operational capability. These advantages appear real; however, I can't say that the Air Force has enough experience to endorse all of these findings yet. The Institute estimates that savings running to 10 percent

will accrue to the Government as a result of the greater efficiencies in the total package procurement process. We would, of course, like very much to verify this estimate.

I would like to mention at this point that the total package procurement philosophy certainly enables us to compete more favorably for national products in our present climate of expanding civilian economy. Total package procurement helps us to minimize the adverse effects of gradual price increases and longer lead times.

The disadvantages attributed to total package procurement may, in some cases, be considered advantages—depending on who is doing the talking. The report suggests that total package procurement may entail greater financial risk, lead to premeture program definition, or cause the contractor to incur increased proposal expenses because of the severe competition. Some analysts today concede that in the long run certain of these total package procurement features may prove to be more positive than negative.

In regard to premature program definition, I don't agree that this is as serious a problem as it may seem on the surface. Admittedly, we must always weigh the relative values of "freezing" a design early, as opposed to making changes during the development or even the production phases. We must permit, and even sponsor, changes that are worthwhile and renegotiate portions of the contract accordingly. The change clause of the contract provides adequate protection for the Government and the contractor. We realize that, when we can spell out systems with great precision, we make it easier for industry to submit good proposals. However, we must not rule out truly desirable changes as opposed to those that would be "nice to have," or those inconsequential changes which only increase costs and extend schedules.

One solution, I suggest, lies in the partial package procurement philosophy I implied earlier. In those areas of fluctuating or uncertain technologies, total package procurement may be too conclusive an approach to be sufficiently responsive.

But in any new system we must draw the line on changes somewhere. I suspect that in total package procurement we are not locking in a system so early that the product will be out-of-date when it's completed. We may, instead, achieve a desirable goal—that of earlier operational availability.

Lt. Gen. Charles H. Terhune Jr., USAF

With respect to the contractor proposal expenses, we are trying to assist in reducing the burden on the contractor caused by voluminous proposals and, at the same time, minimize the time and effort required of the Air Force in screening and evaluating these proposals.

You all have heard of the relatively voluminous proposals submitted on the C-5. Following that experience we managed to reduce the cost data volume by 50 percent for the Short Range Attack Missile (SRAM) proposals. For the Maverick program, the third system to go into total package procurement, the contractors were asked to limit their cost data documents to 25 pages for the proposal.

This was accomplished, although I realize the competitors had to generate a lot more data to arrive at 25-page summaries. Now we're hoping to achieve commensurate reductions in the technical data area. In fact, the overall reduction of paper work is a real objective of our Management Systems Control Board.

Gentlemen, in bringing you this presentation today, I have felt a little like the man trapped in an elevator between floors of a tall office building. The superintendent of the building yelled up to him not to worry, that help was on the way because he had summoned the elevator mechanic. Back came the muffled reply from the elevator shaft, "I am the elevator mechanic."

In serving as the management mechanic at this seminar, I am aware that I have said some things which are subjects of some emotion between the Government and contractors, and sometimes even within the Government itself. Differences of opinion will not go away in an area as vital as contracting. However, additional experience in this area will tend to clear up many differences. The close Air Force-industry relationship has weathered many changes since the days of the Wright brothers. I'm sure it will continue as a major force in strengthening management programs and improving management procedures.

The emphasis on development planning also has relevance for industry. Just as we recognize the value of informing industry of our plans for the future, so might industry benefit by doing more and better development planning, and by including potential subcontractors in this "look ahead."

Good development planning, combined with enlightened and streamlined management procedures, will assure the progressiveness we all expect from the time-honored Air Force-industry partnership.

Foam Reduces Fire Hazards

Air Force Systems Command engineers have adapted a polyurethane foam, originally used in racing cars to retard fire propagation, for use in the fuel tanks of combat aircraft in Vietnam to reduce fire and explosion hazards.

The foam virtually eliminates the risk of explosion in case of a direct hit on the tank by machine gun tracer bullets or other incendiaries. It also suppresses slosh in the tanks during flight and prevents tanks from spewing and spilling fuel spray when ruptured, thus reducing fire hazard.

Polyurethane foam is reticulated—composed of open cells—so that fuel will flow freely through it without being absorbed. The material resembles steel wool but is less dense.

DEPARTMENT OF DEFENSE
PRIME CONTRACT AWARDS BY STATE
TABLE 1. NET VALUE OF MILITARY PROCUREMENT ACTIONS[a]

Fiscal Years 1966 and 1967

(Amounts in Thousands)

State	Fiscal Year				Current Quarter			
	July 1965–June 1966		July 1966–June 1967		April–June 1966		April–June 1967	
	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent
TOTAL, U. S.[b]	$35,713,061		$41,817,093		$12,645,511		$13,067,472	
NOT DISTRIBUTED BY STATE[c]	3,999,758		4,435,430		1,327,918		1,383,534	
STATE TOTALS[d]	31,713,303	100.0%	37,381,663	100.0%	11,317,593	100.0%	11,683,938	100.0%
Alabama	281,549	0.9	297,049	0.8	96,187	0.9	71,731	0.6
Alaska	71,666	0.2	85,648	0.2	22,370	0.2	30,504	0.3
Arizona	248,228	0.8	249,559	0.7	75,511	0.7	63,591	0.5
Arkansas	95,701	0.3	127,180	0.3	27,562	0.2	61,703	0.5
California	5,813,078	18.3	6,688,851	17.9	1,843,560	16.3	2,049,634	17.5
Colorado	255,893	0.8	210,409	0.6	98,742	0.9	85,114	0.7
Connecticut	2,051,560	6.5	1,935,895	5.2	705,802	6.2	432,047	3.7
Delaware	37,445	0.1	51,672	0.1	6,153	0.1	10,360	0.1
District of Columbia	328,111	1.0	357,666	1.0	52,727	0.5	73,600	0.6
Florida	766,955	2.4	799,022	2.1	153,588	1.4	215,946	1.9
Georgia	799,362	2.5	1,148,354	3.1	400,478	3.5	177,843	1.5
Hawaii	64,170	0.2	65,445	0.2	23,311	0.2	24,859	0.2
Idaho	20,004	*	14,772	*	6,729	0.1	3,289	*
Illnois	919,779	2.9	1,063,776	2.8	427,797	3.8	378,630	3.2
Indiana	1,068,259	3.4	898,247	2.4	391,799	3.5	340,712	2.9
Iowa	247,619	0.8	279,328	0.8	98,199	0.9	89,932	0.8
Kansas	312,629	1.0	398,899	1.1	91,735	0.8	112,416	1.0
Kentucky	70,057	0.2	124,294	0.3	23,726	0.2	43,796	0.4
Louisiana	302,906	1.0	656,031	1.8	57,945	0.5	61,518	0.5
Maine	51,340	0.2	56,558	0.2	24,520	0.2	17,544	0.2
Maryland	842,527	2.7	869,808	2.3	283,354	2.5	359,052	3.1
Massachusetts	1,335,952	4.2	1,422,272	3.8	464,335	4.1	445,127	3.8
Michigan	918,426	2.9	1,033,706	2.8	395,362	3.5	390,114	3.3
Minnesota	497,994	1.6	650,584	1.7	164,322	1.5	257,240	2.2
Mississippi	162,305	0.5	114,800	0.3	76,699	0.7	31,227	0.3
Missouri	1,112,665	3.5	2,277,616	6.1	419,092	3.7	796,646	6.8
Montana	13,779	*	78,452	0.2	2,160	*	8,838	0.1
Nebraska	80,478	0.3	103,522	0.3	36,288	0.3	45,567	0.4
Nevada	32,028	0.1	29,315	0.1	4,502	*	6,842	0.1
New Hampshire	109,591	0.3	162,551	0.4	48,578	0.4	54,840	0.5
New Jersey	1,090,122	3.4	1,234,768	3.3	403,390	3.6	381,099	3.3
New Mexico	86,230	0.3	80,472	0.2	25,104	0.2	25,671	0.2
New York	2,819,153	8.9	3,261,750	8.7	1,110,498	9.8	986,832	8.5
North Carolina	449,331	1.4	447,608	1.2	150,244	1.3	122,188	1.0
North Dakota	83,113	0.3	16,729	*	19,396	0.2	6,127	0.1
Ohio	1,588,955	5.0	1,602,593	4.3	579,630	5.1	550,897	4.7
Oklahoma	158,492	0.5	157,350	0.4	36,248	0.3	25,716	0.2
Oregon	89,983	0.3	99,319	0.3	29,200	0.3	27,927	0.2
Pennsylvania	1,665,087	5.3	1,649,142	4.4	749,988	6.6	620,984	5.3
Rhode Island	131,722	0.4	198,030	0.5	66,656	0.6	108,084	0.9
South Carolina	176,424	0.6	180,777	0.5	70,516	0.6	71,045	0.6
South Dakota	23,315	0.1	9,486	*	4,562	*	2,724	*
Tennessee	502,168	1.6	538,225	1.4	184,523	1.6	147,883	1.3
Texas	2,291,454	7.2	3,546,978	9.5	771,032	6.8	1,253,508	10.7
Utah	169,681	0.5	178,850	0.5	40,095	0.4	42,927	0.4
Vermont	81,066	0.3	100,157	0.3	39,568	0.3	46,226	0.4
Virginia	425,487	1.3	665,240	1.8	170,298	1.5	213,744	1.8
Washington	444,368	1.4	606,114	1.6	97,778	0.9	123,737	1.1
West Virginia	149,300	0.5	140,324	0.4	61,623	0.5	38,701	0.3
Wisconsin	364,684	1.1	383,602	1.0	181,921	1.6	138,719	1.2
Wyoming	11,112	*	32,868	0.1	2,190	*	8,937	0.1

For Footnotes, see Page 32.

* Less than 0.05%.

TABLE 2. NET VALUE OF MILITARY PROCUREMENT ACTIONS BY DEPARTMENT[a]

Fiscal Year 1967

(Amounts in Thousands)

State	Total		Army	Navy	Air Force	Defense Supply Agency
	Amount	Percent				
TOTAL U. S.[b]	$41,817,093		$11,371,380	$13,093,162	$11,654,833	$5,697,718
NOT DISTRIBUTED BY STATE[c]	4,435,430		1,153,093	1,170,481	1,162,812	949,044
STATE TOTALS[d]	37,381,663	100.0%	10,218,287	11,922,681	10,492,021	4,748,674
Alabama	297,049	0.8	136,605	20,750	48,820	90,874
Alaska	85,648	0.2	36,661	7,246	35,262	6,479
Arizona	249,559	0.7	64,286	43,916	130,759	10,598
Arkansas	127,180	0.3	27,019	17,477	35,373	47,311
California	6,688,851	17.9	1,052,327	2,341,150	2,650,810	644,564
Colorado	210,409	0.6	37,509	22,562	124,208	26,130
Connecticut	1,935,895	5.2	547,834	1,040,348	279,607	68,106
Delaware	51,672	0.1	6,477	18,147	6,977	20,071
District of Columbia	357,666	1.0	110,588	183,617	59,947	3,514
Florida	799,022	2.1	292,677	130,813	297,554	77,978
Georgia	1,148,354	3.1	76,567	49,505	922,462	99,820
Hawaii	65,445	0.2	22,904	19,974	6,003	16,564
Idaho	14,772	*	374	746	2,037	11,615
Illinois	1,063,776	2.8	532,687	154,367	162,470	214,252
Indiana	898,247	2.4	442,388	146,237	206,648	102,974
Iowa	279,328	0.8	121,779	79,726	31,561	46,262
Kansas	398,899	1.1	204,184	11,515	143,221	39,979
Kentucky	124,294	0.3	61,041	2,082	7,323	53,848
Louisiana	656,031	1.8	124,415	317,805	11,267	202,544
Maine	56,558	0.2	10,973	22,814	6,027	16,744
Maryland	869,808	2.3	143,674	510,244	154,542	61,348
Massachusetts	1,422,272	3.8	366,857	435,291	467,552	152,572
Michigan	1,033,706	2.8	673,068	89,224	120,280	151,134
Minnesota	650,584	1.7	226,042	179,809	179,085	65,648
Mississippi	114,800	0.3	15,717	28,744	18,301	52,038
Missouri	2,277,616	6.1	330,101	1,732,415	142,945	72,155
Montana	78,452	0.2	8,179	258	65,154	4,861
Nebraska	103,522	0.3	58,181	519	14,691	30,131
Nevada	29,315	0.1	10,262	1,430	16,222	1,401
New Hampshire	162,551	0.4	3,953	111,298	21,578	25,722
New Jersey	1,234,768	3.3	353,642	352,196	275,332	253,598
New Mexico	80,472	0.2	50,003	3,111	22,164	5,194
New York	3,261,750	8.7	771,645	1,490,878	637,534	361,693
North Carolina	447,608	1.2	177,389	63,591	24,069	182,559
North Dakota	16,729	*	3,812	594	8,737	3,586
Ohio	1,602,593	4.3	436,462	382,755	658,164	125,212
Oklahoma	157,350	0.4	32,516	8,300	67,492	49,042
Oregon	99,319	0.3	7,776	24,480	8,037	59,026
Pennsylvania	1,649,142	4.4	624,787	504,653	256,590	263,112
Rhode Island	198,030	0.5	23,996	111,175	2,859	60,000
South Carolina	180,777	0.5	27,036	29,883	13,946	109,912
South Dakota	9,486	*	2,069	490	4,389	2,538
Tennessee	538,225	1.4	267,102	63,794	88,327	119,002
Texas	3,546,978	9.5	1,043,184	603,523	1,464,298	435,973
Utah	178,850	0.5	31,599	6,366	111,415	29,470
Vermont	100,157	0.3	82,953	4,135	10,490	2,579
Virginia	665,240	1.8	217,262	343,767	35,484	68,727
Washington	606,114	1.6	66,913	114,109	353,983	71,109
West Virginia	140,324	0.4	93,138	6,703	9,297	31,186
Wisconsin	383,602	1.0	159,262	88,149	44,240	91,951
Wyoming	32,868	0.1	412	0	26,488	5,968

For Footnotes, see Page 32.

* Less than 0.05%

TABLE 3. NET VALUE OF MILITARY PROCUREMENT ACTIONS BY FISCAL YEAR[a]

Fiscal Years 1964, 1965 and 1966

(Amounts in Thousands)

State	Fiscal Year 1964		Fiscal Year 1965		Fiscal Year 1966	
	Amount	Percent	Amount	Percent	Amount	Percent
TOTAL, U. S.[b]	$27,470,379		$26,631,132		$35,713,061	
NOT DISTRIBUTED BY STATE[c]	3,053,272		3,363,052		3,999,758	
STATE TOTALS[d]	24,417,107	100.0%	23,268,080	100.0%	31,713,303	100.0%
Alabama	190,681	0.8	165,176	0.7	281,549	0.9
Alaska	101,545	0.4	74,175	0.3	71,666	0.2
Arizona	173,825	0.7	176,857	0.8	248,228	0.8
Arkansas	29,731	0.1	39,284	0.2	95,701	0.3
California	5,100,650	21.0	5,153,639	22.1	5,813,078	18.3
Colorado	389,511	1.6	249,151	1.1	255,893	0.8
Connecticut	1,126,054	4.6	1,180,111	5.1	2,051,560	6.5
Delaware	30,424	0.1	38,239	0.2	37,445	0.1
District of Columbia	222,947	0.9	247,576	1.0	328,111	1.0
Flordia	782,591	3.2	633,332	2.7	766,955	2.4
Georgia	520,169	2.1	662,417	2.8	799,362	2.5
Hawaii	52,112	0.2	72,213	0.3	64,170	0.2
Idaho	7,804	*	11,724	0.1	20,004	*
Illinois	429,201	1.8	421,899	1.8	919,779	2.9
Indiana	537,940	2.2	604,925	2.6	1,068,259	3.4
Iowa	103,392	0.4	133,951	0.6	247,619	0.8
Kansas	289,045	1.2	229,051	1.0	312,629	1.0
Kentucky	40,476	0.2	42,749	0.2	70,057	0.2
Louisiana	181,427	0.7	255,834	1.1	302,906	1.0
Maine	31,531	0.1	68,771	0.3	51,340	0.2
Maryland	547,936	2.3	584,333	2.5	842,527	2.7
Massachusetts	1,032,062	4.2	1,178,729	5.1	1,335,952	4.2
Michigan	591,290	2.4	532,897	2.3	918,426	2.9
Minnesota	217,941	0.9	259,500	1.1	497,994	1.6
Mississippi	155,911	0.6	152,188	0.7	162,305	0.5
Missouri	1,349,071	5.5	1,060,781	4.6	1,112,665	3.5
Montana	16,422	0.1	69,375	0.3	13,779	*
Nebraska	33,921	0.1	42,708	0.2	80,478	0.3
Nevada	6,361	*	19,142	0.1	32,028	0.1
New Hampshire	64,857	0.3	52,400	0.2	109,591	0.3
New Jersey	917,561	3.8	820,309	3.5	1,090,122	3.4
New Mexico	71,486	0.3	84,137	0.4	86,230	0.3
New York	2,496,438	10.2	2,229,473	9.6	2,819,153	8.9
North Carolina	273,516	1.1	288,408	1.2	449,331	1.4
North Dakota	192,025	0.8	48,997	0.2	83,113	0.3
Ohio	1,028,946	4.2	863,113	3.7	1,588,955	5.0
Oklahoma	122,489	0.5	119,803	0.5	158,492	0.5
Oregon	29,104	0.1	39,624	0.2	89,983	0.3
Pennsylvania	883,065	3.6	988,811	4.2	1,665,087	5.3
Rhode Island	38,173	0.2	86,323	0.4	131,722	0.4
South Carolina	51,621	0.2	81,580	0.4	176,424	0.6
South Dakota	23,308	0.1	21,062	0.1	23,315	0.1
Tennessee	193,564	0.8	197,283	0.8	502,168	1.6
Texas	1,294,431	5.3	1,446,769	6.2	2,291,454	7.2
Utah	340,040	1.4	191,173	0.8	169,681	0.5
Vermont	14,012	0.1	32,202	0.1	81,066	0.3
Virginia	690,852	2.8	469,097	2.0	425,487	1.3
Washington	1,085,696	4.5	545,607	2.3	444,368	1.4
West Virginia	87,327	0.4	90,312	0.4	149,300	0.5
Wisconsin	177,217	0.7	203,003	0.9	364,684	1.1
Wyoming	49,408	0.2	7,867	*	11,112	*

For Footnotes, see Page 32.

* Less than 0.05%.

TABLE 4. NET VALUE OF CIVIL FUNCTIONS PROCUREMENT ACTIONS[e]

Fiscal Years 1964, 1965, 1966 and 1967

(Amount in Thousands)

	Fiscal Year 1964 Jul 63–Jun 64	Fiscal Year 1965 Jul 64–Jun 65	Fiscal Year 1966 Jul 65–Jun 66	Fiscal Year 1967 Jul 66–Jun 67
TOTAL, U.S.[b]	$709,990	$847,926	$878,301	$819,218
NOT DISTRIBUTED BY STATE[c]	37,753	41,020	43,532	40,875
STATE TOTALS[d]	672,237	806,906	834,769	778,343
Alabama	8,766	11,958	16,229	18,441
Alaska	10,599	39,516	15,808	2,818
Arizona	4,011	4,301	2,816	2,742
Arkansas	54,671	76,315	89,427	81,653
California	43,741	59,239	57,844	52,991
Colorado	135	3,702	922	1,539
Connecticut	4,647	5,476	5,197	7,212
Delaware	9,081	8,539	8,973	12,658
District of Columbia	2,033	887	866	1,071
Flordia	28,290	27,659	26,273	35,334
Georgia	2,317	6,862	7,345	9,390
Hawaii	1,916	1,608	1,439	244
Idaho	1,500	3,060	5,822	19,556
Illinois	15,188	24,194	22,192	18,046
Indiana	14,970	22,597	25,080	18,052
Iowa	16,166	14,365	12,160	14,578
Kansas	21,304	18,248	12,884	11,611
Kentucky	28,154	19,303	20,219	21,701
Louisiana	33,279	32,156	54,921	40,600
Maine	1,879	2,238	1,628	1,065
Maryland	8,080	21,457	10,212	1,977
Massachusetts	12,390	11,993	5,065	2,703
Michigan	4,347	12,035	13,027	10,915
Minnesota	2,532	1,686	4,128	3,902
Mississippi	13,673	12,018	16,594	18,300
Missouri	20,144	22,756	29,799	30,941
Montana	83	1,100	3,774	21,840
Nebraska	4,558	8,148	8,613	6,112
Nevada	0	0	0	17
New Hampshire	219	2,431	1,693	107
New Jersey	5,784	6,803	3,303	2,163
New Mexico	724	1,117	3,748	5,955
New York	12,355	13,535	12,400	8,351
North Carolina	3,425	3,797	4,004	3,534
North Dakota	503	1,739	3,311	2,151
Ohio	25,835	17,939	15,884	12,442
Oklahoma	24,699	13,952	31,514	48,773
Oregon	48,034	74,243	86,906	44,354
Pennsylvania	36,678	41,620	37,776	37,760
Rhode Island	3,195	4,951	4,491	574
South Carolina	2,751	3,608	2,472	2,571
South Dakota	11,319	10,915	6,351	2,249
Tennessee	8,946	14,626	18,773	14,039
Texas	49,443	39,420	32,310	28,317
Utah	0	41	565	0
Vermont	64	33	58	90
Virginia	3,770	9,364	6,360	8,764
Washington	36,419	36,323	55,957	58,974
West Virginia	25,578	33,587	23,182	24,039
Wisconsin	3,410	3,426	4,094	5,122
Wyoming	632	20	290	0

For Footnotes, see Page 32.

Footnotes
DOD Prime Contract Awards by State

Footnotes

[a] See Note on Coverage below.

[b] Includes all contracts awarded for work performance in the United States. The United States includes to 50 states, the District of Columbia, U.S. possessions, the Canal Zone, the Commonwealth of Puerto Rico, and other areas subject to the complete sovereignty of the United States, but does not include occupied Japanese islands and trust territories.

[c] Includes contracts of less than $10,000, all contracts awarded for work performance in the Commonwealth of Puerto Rico, U.S. possessions, and other areas subject to the complete sovereignty of the United States; contracts which are in a classified location; and any intragovernmental contracts entered into overseas.

[d] Net value of contracts of $10,000 or more for work in each state and the District of Columbia.

[e] Civil functions of the Army Corps of Engineers for flood control and rivers and harbors work. Civil functions data are shown separately, and are not included in military functions tabulations.

Notes on Coverage

It is emphasized that data on prime contracts by state do not provide any direct indication as to the state in which the actual production work is done. For the majority of contracts with manufacturers, the data reflect location of the plant where the product will be finally processed and assembled. If processing or assembly is to be performed in more than one plant of a prime contractor, the location shown is the plant where the largest dollar amount of work will take place. Construction contracts are shown for the state where the construction is to be performed. For purchases from wholesale or other distribution firms, the location is the address of the contractor's place of business. For service contracts, the location is generally the place where the service is performed, but for transportation and communications services the home office address is frequently used.

More important is the fact that the reports refer to prime contracts only, and cannot in any way reflect the distribution of the very substantial amount of material and component fabrication and other subcontract work that may be done outside the state, where final assembly or delivery takes place.

The report includes definitive contracts and funded portions of letter contracts and letters of intent, job orders, task orders, and purchase orders on industrial firms; and also includes interdepartmental purchases made from or through other government agencies, such as those made through the General Services Administration. The state data include upward or downward revisions and adjustments of $10,000 or more, such as cancellations, price changes, supplemental agreements, amendments, etc.

The estimated amounts of indefinite delivery, open-end, or call type contracts for petroleum are included in the report. Except for petroleum contracts, the report does not include indefinite delivery, open-end, or call type contracts as such, but does include specific purchase or delivery orders of $10,000 or more which are placed against these contracts. Also excluded from the report are project orders, *i.e.*, production orders issued to government-owned-and-operated facilities, such as Navy shipyards. However, the report includes the contracts placed with industry by the government-operated facility to complete the production order.

Control of Army Missile Plant Transferred

Control of the Army Missile Plant, Warren, Mich., has been transferred from the Army Tank-Automotive Command to the Army Missile Command, Redstone Arsenal, Huntsville, Ala.

Effective date for the change was Sept. 30; however, all arrangements will not be completed until Dec. 1.

ASPR Case Listings

(Continued from Page 22)

(U.S. Supreme Court, April 10, 1967 and Nager Electric Co. vs. Unit[e] States (Court of Claims, Oct. 1 1966).

Training and Educational Costs-ASPR 15-204.44. To consider wheth[er] changes in the training and educa[]tional requirements of contractors an[d] the manner of meeting such chang[es] warrants a revision of the prese[nt] ASPR 15-204.44 to be in step wit[h] present needs.

G&A Expenses—ASPR 15-203(c[)] To consider whether ASPR 15-203(c[)] should be revised to provide speci[al] coverage relating to allowability [of] G&A expenses, and to require that th[e] base used to distribute G&A, what[]ever it may be, shall include all item[s] applicable to the base, subject only t[o] adjustments necessary to determin[e] the total amount of the base for th[e] period covered; and to require tha[t] amounts included in the base sha[ll] bear their applicable share of G&A wherever they are disapproved unde[r] government contracts.

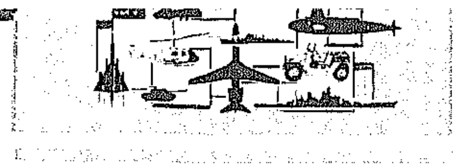
Pricing of Technical Data. To con[]sider the development of appropriat[e] ASPR coverage with respect to th[e] pricing of technical data, giving con[]sideration to the advisability an[d] feasibility of providing for one o[r] more of the following:

- Including technical data price as [a] part of the item to be delivered.
- Requiring contracts to specif[y] all items of technical data as lin[e] items along with their prices.
- Requiring contracts to list onl[y] one price for all technical data.
- Requiring contracts to contai[n] prices for the major categories o[f] technical data, such as technica[l] manuals, pre-procurement data, etc.

Help Wanted Advertising—ASP[R] 15-205.33. To consider revising th[e] cost principle to define the type of re[]cruiting advertising that is allowable

Technical Data Warranty. To con[]sider the advisability of incorporatin[g] in ASPR Section IX, Part 2, a war[]ranty clause for technical data.

Minimum Wage Increases Unde[r] Long-Term Service Contracts. To con[]sider the advisability of an escalatio[n] clause for multi-year service contract[s] to provide for contract adjustmen[t] when the minimum wage rate is in[]creased as a result of government ac[]tion.



DEFENSE PROCUREMENT

Contracts of $1,000,000 and over awarded during the month of September 1967:

DEFENSE SUPPLY AGENCY

1—**Syro Steel Co.**, Girard, Ohio. $8,041,680. 36,000 bundles of steel landing mat sets. Defense Construction Supply Center, Columbus, Ohio.

—**Coastal States Petrochemical Co.**, Houston, Tex. $3,225,730. 30,450,000 gallons of JP-4 jet fuel. Defense Fuel Supply Center, Alexandria, Va.

—**MacMillan Ring-Free Oil Co.**, Los Angeles, Calif. $1,106,880. 800,000 barrels of number six fuel oil. Defense Fuel Supply Center, Alexandria, Va.

5—**Pembroke, Inc.**, Egg Harbor City, N.J. $1,898,817. 79,615 men's blue serge wool overcoats. Defense Personnel Support Center, Philadelphia, Pa.

—**California & Hawaiian Sugar Refining Co.**, San Francisco, Calif. $1,005,722. 7,944,000 lbs. of granulated sugar. Defense Personnel Support Center, Philadelphia, Pa.

7—**K. M. Wilson Co.**, Centerville, Tenn. $2,256,800. 451,360 nylon twill ponchos. Defense Personnel Support Center, Philadelphia, Pa.

8—**L. B. Lawson & Co.**, Long Beach, Calif. $1,232,523. 57,300 cases of ration supplement sundry packs. Defense Personnel Support Center, Philadelphia, Pa.

—**Firestone Tire & Rubber Co.**, Akron, Ohio. $1,609,075. 388,290 steel-helmet liners. Defense Personnel Support Center, Philadelphia, Pa.

11—**Stone Mfg. Co.**, Columbia, S.C. $1,605,215. 3,788,952 pairs of men's cotton drawers. Defense Personnel Support Center, Philadelphia, Pa.

—**J. B. Mfg. Co.**, San Antonio, Tex. $1,548,602. 3,560,088 pairs of men's cotton drawers. Defense Personnel Support Center, Philadelphia, Pa.

14—**B. G. Colton & Co.**, New York, N.Y. $3,561,562. 2,175,000 yards of wind resistant cotton oxford cloth for the Army. Defense Personnel Support Center, Philadelphia, Pa.

—**Pittston Clinchfield Coal Sales Corp.**, New York, N.Y. $2,730,000. 465,000 net tons of bituminous coal. Defense Fuel Supply Center, Alexandria, Va.

—**Rubber Fabricators**, Grantsville, W. Va. $2,033,703. 288,060 pneumatic mattresses. Defense Personnel Support Center, Philadelphia, Pa.

—**Montgomery Pipe & Tube Co.**, Miami, Fla. $1,905,550. 230,000 coils of concertina barbed wire. Defense Construction Supply Center, Columbus, Ohio.

15—**Johnson & Johnson**, New Brunswick, N.J. $1,116,225. 1,276,562 packages of surgical sponges. Defense Personnel Support Center, Philadelphia, Pa.

18—**Gulf Oil Corp.**, New York, N.Y. $1,323,000. 12,600,000 gallons of JP-5 jet fuel. Defense Fuel Supply Center, Alexandria, Va.

19—**Valley Metallurgical Processing Co.**, Essex, Conn. $5,083,986. 6,799,500 lbs. of magnesium powder. Defense General Supply Center, Richmond, Va.

20—**Perl Pillow Co.**, Houston, Tex. $3,098,263. 209,572 mountain sleeping bags. Defense Personnel Support Center, Philadelphia, Pa.

21—**J. P. Stevens & Co.**, New York, N.Y. $2,021,499. 675,000 linear yards of wool serge cloth. Defense Personnel Support Center, Philadelphia, Pa.

22—**Bootz Mfg. Co.**, Evansville, Ind. $2,523,676. 39,172 field range, gasoline burner units. Defense General Supply Center, Richmond, Va.

25—**Sidran Sportswear**, Dallas, Tex. $1,726,074. 173,040 men's coated nylon twill raincoats. Defense Personnel Support Center, Philadelphia, Pa.

—**M. Wile & Co.**, Buffalo, N.Y. $1,277,356. 50,000 men's polyester/wool tropical coats. Defense Personnel Suport Center, Philadelphia, Pa.

26—**U.S. Metal Container Co.**, Miami, Okla. $1,119,650. 320,000 five-gallon gasoline cans. Defense General Supply Center, Richmond, Va.

—**Goodstein Bros. and Co.**, New York, N.Y. $1,205,717. 46,344 men's wool serge overcoats. Defense Personnel Support Center, Philadelphia, Pa.

29—**The Defense General Supply Center**, Richmond, Va., has awarded the following contracts for polypropylene sandbags:
Pioneer Bag Co., Kansas City, Mo. $3,061,660. 16,350,000 sandbags.
Bemis Co., Minneapolis, Minn. $1,335,000. 7,000,000 sandbags.
Continental Bag Co., Crowley, La. $1,234,920. 6,350,000 sandbags.
Sparling Mills, Greenville, R.I. $1,900,000. 10,000,000 sandbags.

DEPARTMENT OF THE ARMY

1—**Harnischfeger Corp.**, Milwaukee, Wis. $1,127,088. Twenty-ton cranes. Escanaba, Wash. Mobility Equipment Command, St. Louis, Mo.

—**American Optical Co.**, Keene, N.H. $3,621,651. XM44E1 periscopes and related spare parts. Frankford Arsenal, Philadelphia, Pa.

—**General Dynamics**, Pomona, Calif. $7,747,719. Long lead time items required in the manufacture of Redeye weapons system hardware for FY 1968. Army Missile Command, Huntsville, Ala.

—**Hughes Aircraft**, Culver City, Calif. $4,900,000. TOW industrial engineering services. Army Missile Command, Huntsville, Ala.

—**White Motor Corp.**, Lansing, Mich. $1,093,860. Cylinder heads for 2½-ton trucks. Tank Automotive Command, Warren, Mich.

—**J. W. Bateson Co.** $10,633,010. Construction of 10 enlisted men's barracks complexes at Fort Gordon, Ga. Engineer Dist., Savannah, Ga.

—**Shellmaker, Inc.**, San Francisco, Calif. $1,517,800. Widening of the Redondo Beach, Calif., breakwater and for beach protection. Engineer Dist., Los Angeles, Calif.

—**Colt's, Inc.**, Hartford, Conn. $25,871,701. M16A1 rifles. Army Weapons Command, Rock Island, Ill.

5—**John Wood Co.**, St. Paul, Minn. $3,672,240. Fin assemblies for 750-lb. bombs. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**L. T. Industries, Inc.**, Dallas, Tex. $2,860,650. Fin assemblies for 750-lb. bombs. Garland, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Poloron Products**, New Rochelle, N.Y. $2,176,000. Fin assemblies for 750-lb. bombs. Scranton, Pa. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Sante Fe Engineers**, Lancaster, Calif. $2,885,000. Construction work on remodeling a SAGE building for conversion into an audio-visual facility. Norton AFB, Calif. Engineer Dist., Los Angeles, Calif.

6—**AVCO Corp.**, Stratford, Conn. $1,481,000. Blade sets and support assemblies for T53 turbine engines. Aviation Materiel Command, St. Louis, Mo.

—**Firestone Tire & Rubber Co.**, Akron, Ohio. $2,643,432. Track shoe assemblies for M60A1E2 tanks and M728 combat engineer vehicles. Noblesville, Ind. Tank Automotive Command, Warren, Mich.

—**Chrysler Corp.**, Centerline, Mich. $11,162,256. Fork lift trucks. Warren, Mich. Mobility Equipment Command, St. Louis, Mo.

—**Cadillac Gage Co.**, Warren, Mich. $1,632,000. Light armored cars. Tank Automotive Command, Warren, Mich.

—**Western Electric**, New York, N.Y. $215,270,329. Continued research and development of the Nike-X missile system. Whippany, N.J.; Burlington, N.C.; Orlando, Fla.; Bedford, Mass.; St. Paul, Minn.; Syracuse, N.Y.; and Santa Monica, Calif. $13,168,631. Deployment planning activities for the Nike X missile system. Redwood City, Calif., Bedford, Mass. and Wayland, Mass. $3,000,000. Facilities to support Nike X research and development. Nike X Project Office, Redstone Arsenal, Huntsville, Ala.

7—**Bell Aerospace Corp.**, Fort Worth, Tex. $37,656,217. UH-1H helicopters. Aviation Materiel Command, St. Louis, Mo.

—**Bell Aerospace Corp.**, Fort Worth, Tex. $25,170,000. AH-1G helicopters. Aviation Materiel Command, St. Louis, Mo.

—**Chamberlain Mfg. Corp.**, Waterloo, Iowa. $4,750,200. Metal parts for 175mm projectiles. Scranton, Pa. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**International Harvester Co.**, Melrose Park, Ill. $2,693,023. Diesel engine driven trac-

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CONTRACT LEGEND

Contract information is listed in the following sequence: Date—Company — Value — Material or Work to be Performed—Location of Work Performed (if other than company plant) — Contracting agency.

—Atlas Chemical Industries, Valley Forge, Pa. $1,292,500. Detonators. Reynolds, Pa. Picatinny Arsenal, Dover, N.J.

12—Bethlehem Steel Corp., Bethlehem, Pa. $1,651,511. Components for 175mm guns. Watervliet Arsenal, Watervliet, N.Y.

—Privitt Plastics, Inc., Mineral Wells, Tex. $1,300,024. Plastic grommets for 155mm shells. Ammunition Procurement & Supply Agency, Joliet, Ill.

13—Continental Motors, Muskegon, Mich. $5,416,668. Five-ton-truck engines. Tank Automotive Command, Warren, Mich.

—Honeywell, Inc., Hopkins, Minn. $2,847,512. Grenade fuzes. New Brighton, Minn. and St. Louis Park, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Lockheed-Georgia Co., Marietta, Ga. $1,570,207. Gun tubes for 105mm cannons. Chattanooga, Tenn. Watervliet Arsenal, Watervliet, N.Y.

14—Peter Kiewit Sons' Co., Omaha, Neb. $9,744,994. Completion of work on the lock at Dardanelle Lock and Dam, Arkansas. Engineer Dist., Little Rock, Ark.

—Baldwin-Lime-Hamilton Corp., Eddystone, Pa. $9,468,600. Design, performance model testing, manufacture and delivery of hydraulic turbines for The Dalles, Ore., dam project. Engineer Dist., Portland, Ore.

—Jarka Corp., Baltimore, Md. $4,451,413. Stevedoring and related terminal services from Oct. 1, 1967 through Sept. 30, 1969, at the Dundalk Marine Terminal, Baltimore, Md. Headquarters, Eastern Area, Military Traffic Management and Terminal Service, Brooklyn, N.Y.

—Philco-Ford Corp., Newport Beach, Calif. $4,024,297. Delivery stretch out, incorporation of engineering release records, and engineering changes pertaining to the Chapparral missile system. Army Missile Command, Huntsville, Ala.

—Atlantic, Gulf & Pacific Co., New York, N.Y. $1,681,485. Dredging sections of the inland waterway from the Delaware River to Chesapeake Bay. Engineer Dist., Philadelphia, Pa.

15—A. O. Smith Corp., Chicago, Ill. $19,110,700. 750-lb. bombs. Waco, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Hercules, Inc., Wilmington, Del. $16,948,393. Miscellaneous propellants and explosives. Radford, Va. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Chamberlain Mfg. Corp., Waterloo, Iowa. $4,470,484. 155mm projectiles. Scranton, Pa. Ammunition Procurement & Supply Agency, Joliet, Ill.

—General Dynamics, Rochester, N.Y. $4,699,062. Radio sets. Electronics Command, Philadelphia, Pa.

—General Motors, Cleveland, Ohio. $3,144,120. 155mm, M109 howitzers. Army Weapons Command, Rock Island, Ill.

—General Motors, Indianapolis, Ind. $2,757,475. General Sheridan tank transmissions. Tank Automotive Command, Warren, Mich.

—Minnesota Mining & Mfg., Rochester, N.Y. $2,110,406. M47 and M48 periscope sets with equipment and spare parts. Frankford Arsenal, Philadelphia, Pa.

—General Motors, Detroit, Mich. $1,433,734. 6V53T engines for the General Sheridan tank. Tank Automotive Command, Warren, Mich.

18—Amis Construction Co., Oklahoma City, Okla. $3,527,120. Work on the Robert S. Kerr Lock and Dam at Sallisaw, Okla. Engineer Dist., Tulsa, Okla.

—John Wood Co., St. Paul, Minn. $1,237,248. Fin assemblies with crates for the 750-lb. bomb. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Technical Operations, Inc., Burlington, Mass. $1,133,000. Additional scientific and technical effort for the Combat Development Command, Fort Belvoir, Va. Northwest Procurement Detachment, Oakland, Calif.

19—Kentron Hawaii, Ltd., Honolulu, Hawaii. $7,690,024. Operation, maintenance and development of Kwajalein Test Site Technical Facilities. Nike X Project Office, Huntsville, Ala.

—American Cystoscope Makers, Inc., Pelham Manor, N.Y. $1,603,750. Periscopes for use on Main Battle Tanks. New York, N.Y. Frankford Arsenal, Philadelphia, Pa.

—General Time Corp., Stamford, Conn. $1,335,000. Booster and safety devices for artillery fuzes. Gadsden, Ala. Ammunition Procurement & Supply Agency, Joliet, Ill.

—AVCO Corp., Stratford, Conn. $1,668,161. Repair parts, ground support equipment and special tools in support of T-55-L-11 engines for CH-47 Chinook helicopters. $4,540,998. Conversion kits to modify engines for CH-47 helicopters. Aviation Materiel Command, St. Louis, Mo.

20—General Electric, Schenectady, N.Y. $1,181,395. Klystron tubes for high power acquisition radar for Nike Hercules. Army Missile Command, Huntsville, Ala.

—R. G. LeTourneau, Inc., Longview, Tex. $5,366,150. 750-lb. demolition bombs. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Kollsman Instrument Corp., Elmhurst, N.Y. $1,062,026. Firing devices for antipersonnel mines. Bridgeport, Conn. Picatinny Arsenal, Dover, N.J.

—General Motors, Kokomo, Ind. $2,182,059. Radio transmitters and receivers. Electronics Command, Philadelphia, Pa.

21—Standard Container Co., Montclair, N.J. $1,650,000. Ammunition packing boxes. Homerville, Ga. Frankford Arsenal, Philadelphia, Pa.

—Brads Machine Products, Gadsden, Ala. $3,062,040. Booster and safety devices for artillery fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Chrysler Corp., Centerline, Mich. $1,954,064. Fork lift trucks. Warren, Mich. Mobility Equipment Command, St. Louis, Mo.

—Anthony Co., Streator, Ill. $1,028,950. Fork lift trucks. Mobility Equipment Command, St. Louis, Mo.

22—General Motors, Detroit, Mich. $15,000,000. Metal parts for 105mm high explosive projectiles. St. Louis, Mo. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Weatherhead Co., Cleveland, Ohio. $1,164,596. Pressure plates for 4.2-inch cartridge assemlies. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Pensacola Construction Co., Kansas City, Mo. $1,058,650. Work on the Mississippi River and Tributaries-Channel Improvement Project. Near Greenville, Miss. and Lake Village, Ark. Engineer Dist., Vicksburg, Miss.

—Massman Construction Co. and Al Johnson Construction Co., Kansas City, Mo. $28,552,645. Work on the Kaskaskia River Navigation Project. Ellis Grove, Ill. Engineer Dist., St. Louis, Mo.

—Johnson Corp., Bellevue, Ohio. $1,000,754. 1½-ton cargo trailers. Tank Automotive Command, Warren, Mich.

—Hol-Gar Mfg. Co., Primos, Pa. $1,058,750. 28-volt generator sets. Mobility Equipment Command, St. Louis, Mo.

—Litton Systems, Van Nuys, Calif. $2,549,520. Data Converters, Coordinated Air Defense Systems. Van Nuys and Salt Lake City, Utah. Army Missile Command, Huntsville, Ala.

25—Honeywell, Inc., Tampa, Fla. $5,500,000. Classified electronics equipment. Electronics Command, Fort Monmouth, N.J.

—Litton Systems, Woodland Hills, Calif. $1,500,000. Airborne navigation systems for OV-1D Mohawk helicopters and ancillary items. Electronics Command, Fort Monmouth, N.J.

—RCA, Van Nuys, Calif. $1,000,000. Classified electronics equipment. Electronics Command, Fort Monmouth, N.J.

—Mason Rust, Pittsburgh, Pa. $7,780,000. Reactivation of facilities at Gateway Army Ammunition Plant, St. Louis, Mo. Engineer Dist., Kansas City, Mo.

26—Ford Motors, Dearborn, Mich. $34,840,925. ¼-ton utility trucks. Highland Park, Mich. General Purpose Vehicles Project Manager, Warren, Mich.

—Zenith Radio Corp., Chicago, Ill. $2,135,480. Metal parts for 66mm rocket fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Stanford Research Institution, Menlo Park, Calif. $2,098,784. Antimissile Missile System study. Nike-X Project Office, Redstone Arsenal, Huntsville, Ala.

—List & Clark Construction Co., Overland Park, Kan. $1,174,432. Construction of a new roadway and bridge at Stockton Reservoir, Stockton, Mo. Engineer Dist., Kansas City, Mo.

—Lsi Service Corp., Mid West City, Okla. $3,895,794. Maintenance of Army aircraft. Aviation Materiel Command, St. Louis, Mo.

—Dynalectron Corp., Fort Worth, Tex. $2,938,932. Maintenance of Army aircraft. Aviation Materiel Command, St. Louis, Mo.

—Boeing Co., Morton, Pa. $1,338,630. Rotary heads for CH-47 helicopters. $1,115,624. Inspection and repair of CH-47A aircraft. Aviation Materiel Command, St. Louis, Mo.

27—National Presto Industries, Eau Claire, Wis. $10,000,000. Metal parts for 105mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Supreme Products Corp., Chicago, Ill. $1,514,100. Metal parts for 750-lb. bomb nose fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Avionics, Inc., South Bend, Ind. $1,375,544. Cable assemblies for 250 and 500 lb. bombs. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Zenith Radio Corp., Chicago, Ill. $1,228,200. Metal parts for 66mm rocket fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Morrison Knudsen Co., South Gate, Calif. $1,175,500. Sealing the site construction area at the New Melones Dam on the Stanislaus River in California. Corps of Engineers.

—Brezina Construction Co., Rapid City, S.D. and Korshoj Construction Co., Blair, Neb. $1,030,006. Construction of a levee along the Missouri River near Bellevue, Neb. Corps of Engineers.

28—Chamberlain Mfg. Corp., Waterloo, Iowa. $3,656,800. 2.75-inch rocket warheads. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Columbus Milpar Mfg. Co., Columbus, Ohio. $1,917,000. Metal parts for 81mm cartridge point detonating fuzes. Westerville, Ohio. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Honeywell, Inc., Hopkins, Minn. $1,689,048. Metal parts for 40mm cartridges. New Brighton, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Supreme Products, Chicago, Ill. $1,505,000. Metal parts for 750-lb. bomb nose fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Grand Machining Co., Detroit, Mich. $1,014,000. 81mm mortar fin assemblies. Vero Beach, Fla. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Page Aircraft Maintenance, Inc., Lawton, Okla. $15,700,000. Aircraft maintenance for rotary and fixed wing aircraft at Fort Rucker, Ala., and Fort Stewart, Ga., from Oct. 1, 1967 through June 30, 1968. Purchasing and Contracting Office, Fort Rucker, Ala.

—Sylvania Electric Products, Williamsville, N.Y. $2,788,718. Light observation helicopter avionics packages. Electronics Command, Fort Monmouth, N.J.

—P. R. Mallory Co., Terrytown, N.Y. $2,521,079. Dry batteries for night vision site weapons. Lexington, N.C. Electronics Command, Philadelphia, Pa.

—Hupp Corp., Canton, Ohio. $1,737,701. 20 horsepower industrial engines. Mobility Equipment Command, St. Louis, Mo.

29—Uniroyal, Inc., New York, N.Y. $74,455,016. Various explosives, 105mm projectiles, and maintenance and support services. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Olin Mathieson Chemical Corp., East Alton, Ill. $67,340,517. Miscellaneous propellant charges; bag loading; and maintenance and support services. Charlestown, Ind. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Day & Zimmerman, Philadelphia, Pa. $62,370,874. Loading, assembling and packing miscellaneous medium caliber items and components. Texarkana, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Kisco Co., St. Louis, Mo. $10,650,000. 105mm cartridge cases. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Olin Mathieson Chemical Corp., East Alton, Ill. $6,126,458. Ball powder, nitric acid, and maintenance and support services. Baraboo, Wis. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Kennedy Van Saun Corp., Danville, Pa. $4,628,200. Metal parts for 105mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Canadian Commercial Corp., Ottawa, Canada. $8,174,875. 105mm cartridge cases.

Quebec City, Canada. Ammunition Procurement & Supply Agency, Joliet, Ill.

—FMC Corp., New York, N.Y. $2,979,249. Production of a classified agent; and maintenance and support services. Newport, Ind. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Ravenna Arsenal, Inc.**, Akron, Ohio. $2,363,390. Maintenance and support services at the Ammunition Plant, Ravenna, Ohio. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Gibbs Mfg. & Research Corp.**, Janesville, Wis. $1,638,000. Metal parts for 2.75-inch rocket fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Stewart-Warner Corp.**, Indianapolis, Ind. $1,618,617. Metal parts for 750-lb. bomb nose fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Honeywell, Inc.**, Hopkins, Minn. $1,558,678. Metal parts for fuzes for 40mm cartridges. New Brighton, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Medico Industries**, Wilkes-Barre, Pa. $1,404,000. 2.75-inch rocket warheads. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Buchmann Spark Wheel Corp.**, Long Island, City, N.Y. $1,293,290. Cartridge container extension for the 4.2-inch cartridge. Commack, N.Y. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Nash-Hammond, Inc.**, City of Industry, Calif. $1,222,787. Plastic canisters for the Tactical Fighter Dispensing Munitions Program. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Bulova Watch Co.**, Jackson Heights, N.Y. $1,026,000. Metal parts for fuzes for 81mm cartridges. Valley Stream, N.Y. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Western Electric**, New York, N.Y. $6,918,054. FY 1968 Nike Hercules and Improved Nike Hercules engineering services. Burlington, N.C., Santa Monica, Calif. and Syracuse, N.Y. Army Missile Command, Huntsville, Ala.

—**Philco-Ford**, Newport Beach, Calif. $4,024,297. Incorporation of major improvements into the Chaparral Air Defense Guided Missile System. Army Missile Command, Huntsville, Ala.

—**Martin-Marietta**, Orlando, Fla. $3,668,268. Power Station for the Pershing missile system. $1,684,686. Installation of modification kits in support of the Pershing weapons system. Army Missile Command, Huntsville, Ala.

—**Philco-Ford Corp.**, Newport Beach, Calif. $1,500,000. Extension of engineering services on the Shillelagh missile system. Army Missile Command, Huntsville, Ala.

—**Western Electric**, New York, N.Y. $48,425,000. Additional effort on the Nike-X Research & Development Program. Syracuse, N.Y.; Whippany, N.J.; Bedford, Mass.; Orlando, Fla. and Burlington, N.C. Nike-X Project Office, Redstone Arsenal, Huntsville, Ala.

—**Mine Safety Appliance Co.**, Pittsburgh, Pa. $8,046,417. Field protective masks. Esmond, R.I. Edgewood Arsenal, Md.

—**Boeing Co.**, Morton, Pa. $6,000,000. CH-47 Chinook Helicopters, and engineering and procurement data. Aviation Materiel Command, St. Louis, Mo.

—**AVCO Corp.**, Stratford, Conn. $5,990,976. T53-L-13 engines for UH-1 Iroquois helicopters. Aviation Materiel Command, St. Louis, Mo.

—**Raytheon Co.**, Norwood, Mass. $4,902,000. Communications equipment. North Dighton, Mass. Electronics Command, Philadelphia, Pa.

—**General Electric**, Springfield, Mass. $4,772,982. Production of the M-73E1 machine gun. Army Weapons Command, Rock Island, Ill.

—**Litton Systems**, Van Nuys, Calif. $3,217,000. Scientific and technical effort to support the combat development command experimentation during FY 1968. Fort Ord, Calif. Northwest Procurement Agency, Oakland, Calif.

—**Electro-Optical Systems**, Pasadena, Calif. $1,500,000. Work on the Night Vision Program. Pomona, Calif. Electronics Command, Forth Monmouth, N.J.

—**General Motors**, Kokomo, Ind. $1,007,190. Radio transmitters and receivers. Electronics Command, Philadelphia, Pa.

—**Lockheed Aircraft**, Metuchen, N.J. $1,005,063. Work required to prove the performance relative to the facility and onsite acceptance testing program for Stage I and II of the Integrated Wide Band Communication System now being installed in Southeast Asia. Procurement Div., Fort Huachuca, Ariz.

DEPARTMENT OF THE NAVY

1—**American Mfg. Co. of Tex.**, Fort Worth, Tex. $19,320,000. 500-lb. bomb bodies. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**United Aircraft**, Norwalk, Conn. $1,537,797. Spare parts for test sets used to check AN/APQ88/92/103/112 systems on A-6A aircraft. Aviation Supply Office, Philadelphia, Pa.

5—**Sperry Rand Corp.**, Bristol, Tenn. $7,082,444. Wing, fin, and guidance and control sections for Shrike missiles. Naval Air Systems Command.

—**Johns Hopkins University**, Silver Spring, Md. $3,482,620. Research and development on the Talos missile. Naval Ordnance Systems Command.

—**Texas Instruments, Inc.**, Dallas, Tex. $13,828,129. Wing, fins, and guidance and control sections for Shrike missiles. Naval Air Systems Command.

—**Willamette Iron & Steel Co.**, Portland Ore. $1,228,585. Regular overhaul of the landing ship, dock USS Point Difiance (LSD-31). Supervisor of Shipbuilding, Thirteenth Naval Dist., Seattle, Wash.

6—**Automatic Sprinkler Co.**, Carrollton, Tex. $15,217,169. Fin assemblies for MK 82 bombs. Navy Ships Parts Control Center, Mechanicsburg, Pa.

7—**Sanders Associates**, Nashua, N.H. $2,669,437. Continued basic engineering and development of an air droppable ASW sonobuoy system. Naval Air Systems Command.

—**Consolidated Diesel Electric Co.**, Old Greenwich, Conn. $2,054,250. 75 aircraft refueling tank-trucks. Midwest Div., Naval Facilities Engineering Command, Great Lakes, Ill.

—**Dynell Electronics Corp.**, Plainview, N.Y. $2,035,320. Production of radar sets for the Navy and for Australia. Naval Ordnance Systems Command.

—**RCA**, Princeton, N.J. $2,000,000. Six navigation satellites. Special Projects Office.

8—**Bath Iron Works Corp.**, Bath, Maine. $38,451,900. Repair and modernization of six guided missile frigates. Naval Ship Systems Command.

—**Grumman Aircraft Engineering Corp.**, Bethpage, N.Y. $10,265,000. Research and development on the EA-6B aircraft. Naval Air Systems Command.

—**Sperry Rand Corp.**, Long Island City, N.Y. $4,200,000. Production of computers to be installed in the subsystem of gunfire control systems. Naval Ordnance Systems Command.

—**United Aircraft**, Stratford, Conn. $1,000,000. Increase of long lead time effort for HH-3E helicopters for the Air Force. Naval Air Systems Command.

11—**McDonnell Douglas Co.**, St. Louis, Mo. $43,300,000. Long lead time effort in support of procurement of F-4E and F-4D aircraft Naval Air Systems Command.

—**Sperry Rand Corp.**, Great Neck, N.Y. $1,144,000. Engineering effort to perform a research and development program on Talos guided missile fire control systems. Naval Ordnance Systems Command.

12—**General Precision, Inc.**, Riverdale, Md. $5,071,346. Training devices for P-3C prototype aircraft. Naval Training Device Center, Orlando, Fla.

—**RCA**, Princeton, N.J. $4,328,370. Six Navy navigation satellites. Special Projects Office.

—**North American Aviation**, Anaheim, Calif. $2,121,000. Modification and fabrication of ships inertial navigation system equipment. Naval Ship Systems Command.

—**Control Data Corp.**, Minneapolis, Minn. $1,800,000. Increase in the capacity of the basic control data 6400 computer systems at the Fleet Numerical Weather Facility, Monterey, Calif. Arden Hills, Minn. Naval Postgraduate School, Monterey, Calif.

13—**Lockheed Aircraft**, Burbank, Calif. $25,900,000. Configuration change in P-3B aircraft and for associated engineering, planning and tooling. Naval Air systems Command.

—**United Aircraft**, East Hartford, Conn. $3,089,303. Partial conversion of a cost plus incentive fee letter contract for Phase II development of TF-30-P-12 engines. Naval Air Systems Command.

—**Magnavox Co.**, Fort Wayne, Ind. $1,105,879. Basic engineering and development of an air droppable sonobuoy system. Naval Air Systems Command.

—**Lockheed Aircraft**, Burbank, Calif. $1,000,000. Avionics equipment for P-3B aircraft. Naval Air Systems Command.

—**American Mfg. Co. of Tex.**, Fort Worth, Tex. $10,807,420. 38 caliber projectiles. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**Curtis-Wright Corp.**, Wood-Ridge, N.J. $1,024,605. Kits in support of aircraft engines. Aviation Supply Office, Philadelphia, Pa.

14—**Grumman Aircraft Engineering Corp.**, Bethpage, N.Y. $54,476,590. A-6A aircraft. Naval Air Systems Command.

—**Westinghouse Electric**, Pittsburgh, Pa. $17,178,800. Designing and furnishing nuclear propulsion components. Naval Ship Systems Command.

—**Conco Engineering Works**, Mendota, Ill. $1,479,000. MK 77, MOD 2, 500-lb. bombs. Naval Ordnance Systems Command.

—**L. B. Priester & Son**, Meridian, Miss. $1,146,000. Construction of a BOQ addition at the Naval Auxiliary Air Station, Meridian, Miss. Southeast Div., Naval Facilities Engineering Command.

—**Canadian Commercial**, Ottawa, Canada. $2,000,000. Structural components for the attack aircraft carrier USS MIDWAY (CVA-41). Montreal, Canada. Navy Supply Center, Oakland, Calif.

15—**R. G. Webb, Inc.**, Riverside, Calif. $2,870,000. Construction of housing units at the Long Beach, Calif., Naval Station. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif.

19—**Norris Industries**, Los Angeles, Calif. $26,548,622. MK 82 bomb bodies. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**Grumman Aircraft Engineering Corp.**, Bethpage, N.Y. $20,800,000. A6A aircraft. Naval Air Systems Command.

—**North American Aviation**, Anaheim, Calif. $9,300,000. AN/ASB-12 bomb navigation systems for RA-5C aircraft. Naval Supply Systems Command.

—**North American Aviation**, McGregor, Tex. $1,476,600. Increase limitation of authorization for Shrike missiles. Naval Air Systems Command.

—**General Dynamics**, Pomona, Calif. $5,946,000. Standard Arm Missile procurement. Naval Air Systems Command.

20—**FMC Corp.**, San Jose, Calif. $1,410,326. Roadwheel assemblies and roadwheel caps for Landing Vehicles. Marine Corps.

21—**United Aircraft**, East Hartford, Conn. $356,867,401. Modification to an existing contract of $335,900,280 for TF30-P-12 and TF30-P-3 engines for the Navy and Air Force. Naval Air Systems Command.

—**United Aircraft**, Stratford, Conn. $2,873,784. S-61-R helicopters for the Air Force. Naval Air Systems Command.

—**General Dynamics**, San Diego, Calif. $1,218,000. Testing and equipping of two newly developed prototype ocean data buoys to be used for a major new scientific program designed to collect oceanographic and meteorological data in the North Pacific. Office of Naval Research.

22—**General Electric**, Washington, D.C. $5,057,031. Support services for Polaris fire control and support equipment. Pittsfield, Mass. Special Projects Office.

—**International Telephone & Telegraph Corp.**, Nutley, N.J. $1,799,879. Omega navigation sets, including repair parts, training, engineering services and data support. Naval Ship Systems Command.

—**Hazeltine Corp.**, Little Neck, N.Y. $1,452,-281. Detection/transmitting sets. Naval Air Systems Command.

—**LTV Aerospace Corp.**, Dallas, Tex. $6,-000,000. Increase the limitation of authorization for long lead time effort for A-7D aircraft for the Air Force. Naval Air Systems Command.

25—**Defoe Shipbuilding Co.**, Bay City, Mich. $17,818,739. Design and construction of two medium surveying ships. Naval Ship Systems Command.

—**Bendix Corp.**, Mishawaka, Ind. $15,067,-021. FY 1968 funding for production of guidance, control and airframe units for the Talos missile. Naval Ordnance Systems Command.

—**Lockheed Missiles & Space Co.**, Sunnyvale, Calif. $7,060,364. Development effort related to the Poseidon missile system. Special Projects Office.

—**General Dynamics**, Pomona, Calif. $8,000,-000. Increase to the limitation of authorization for Standard Army missiles. Naval Air Systems Command.

—**Varo, Inc.**, Garland, Tex. $2,086,346. Guided missile launchers. Naval Air Systems Command.

—**Hughes Aircraft**, Culver City, Calif. $2,-000,000. Installment funding for Phoenix missile system. Naval Air Systems Command.

—**Royal Industries**, Santa Ana, Calif. $1,-619,535. 600-gallon external auxiliary fuel tanks. Naval Air Systems Command.

—**International Telephone & Telegraph Corp.**, Fort Wayne, Ind. $1,835,280. MK 3 MOD 0 electronic assemblies for the Shrike missile fuzing system. Naval Air Systems Command.

26—**Norris Industries**, Los Angeles, Calif. $9,-590,392. 250-lb. bomb bodies. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**North American Aviation**, Columbus, Ohio. $5,990,260. OV-10A aircraft for the Marine Corps. Naval Air Systems Command.

27—**U.S. Steel**, Pittsburgh, Pa. $3,468,240. 250-lb. bomb bodies. McKeesport, Pa. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**Lockheed Missiles & Space Co.**, Sunnyvale, Calif. $2,300,000. Long lead materials for the Polaris missile system. Special Projects Office.

—**Akwa-Downey Construction Co.**, Milwaukee, Wis. $2,269,967. Construction of bachelor officer's quarters and a mess addition at the Naval Training Center, San Diego, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif.

—**Westinghouse Electric**, Baltimore, Md. $1,-448,700. APD-7 side-looking radar systems for installation in RA-5C aircraft. Aviation Supply Office, Philadelphia, Pa.

—**Bethlehem Steel**, Terminal Island, Calif. $1,362,859. Regular overhaul of the landing ship, dock USS Cabildo (LSD-16). Supervisor of Shipbuilding, Eleventh Naval Dist., Long Beach, Calif.

28—**Poloron Products**, New Rochelle, N.Y. $10,518,974. Conical fin assemblies for 500-lb bombs. Scranton, Pa. Naval Ships Parts Control Center, Mechanicsburg, Pa.

—**Lasko Metal Products**, West Chester, Pa. $8,993,195. MK 14 MOD 1 retard fin assemblies for 250-lb. bombs. Hughestown, Pa. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**Dell Industries**, Waycross, Ga. $4,854,039. Conical fin assemblies for 500-lb. bombs. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**Straightline Mfg. Co.**, Cornwells Heights, Pa. $3,464,434. Conical fin assemblies for MK 81, 250-lb. bombs. Navy Ships Parts Control Center, Mechanicsburg, Pa.

29—**Raytheon Co.**, Bedford, Mass. $2,878,000. Research and development of the Sparrow AIM-7F guided missile. Naval Air Systems Command.

—**Northrop Electronics Co.**, Hawthorne, Calif. $1,686,087. AN/SRN-12 Omega receivers. Naval Electronics Systems Command.

DEPARTMENT OF THE AIR FORCE

1—**Chromalloy American Corp.**, New York, N.Y. $2,949,142. Repair of J-57, J-75 and TF-33 aircraft engines. West Nyack, N.Y. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

—**Boeing Co.**, Seattle, Wash. $54,104,563. Modernization of the Minuteman force. Knobnoster, Mo. Space and Missile Systems Organization (AFSC), Norton AFB, Calif.

—**McDonnell-Douglas Corp.**, Santa Monica, Calif. $2,613,188. Design, development, fabrication and testing of a Titan IIIC payload system. Space and Missile Systems Organization, (AFSC), Norton AFB, Calif.

—**Boeing Co.**, Seattle, Wash. $1,027,107. Modernization of the Minuteman Force. Space and Missile Systems Organization, (AFSC), Norton AFB, Calif.

5—**Western Electric**, New York, N.Y. $4,845,-284. Engineering support of missile guidance systems. Burlington, N.C. Space and Missile Systems Organization, (AFSC), Los Angeles, Calif.

—**Boeing Co.**, Seattle, Wash. $2,100,000. Engineering services in support of Minuteman missile systems. Space and Missile Systems Organization, (AFSC), Los Angeles, Calif.

—**Northrop Corp.**, Hawthorne, Calif. $19,-431,700. T-38 aircraft. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Hughes Aircraft**, Los Angeles, Calif. $2,-600,000. Electronic countermeasure equipment. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**RCA**, Morristown, N.J. $2,500,000. FPS/95 radar system. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass.

6—**North American Aviation**, Anaheim, Calif. $1,429,875. Manufacture of spare parts in support of the guidance and control system of Minuteman II missiles. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

7—**Airesearch Mfg. Co.**, Phoenix, Ariz. $1,-244,088. Manufacture of gas turbine compressors. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

8—**United Aircraft**, East Hartford, Conn. $4,-720,081. Manufacture and castings and forgings to be used to produce spare parts applicable to TF-33 and J-57 engines. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

12—**Gary Aircraft Corp.**, Victoria, Tex. $1,-990,863. Inspection and repair of C-54 aircraft. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—**Sargent Fletcher Co.**, El Monte, Calif., $1,-424,167. Manufacture of external auxiliary tanks and pylons for F-4 aircraft. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

13—**Radiation, Inc.**, Melbourne, Fla. $1,992,-818. Modification of radar components. Air Force Eastern Test Range, Patrick AFB, Fla.

—**General Electric**, Arkansas City, Kan. $1,-852,224. Overhaul and modification of J-85 engines and components. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

—**General Electric**, Philadelphia, Pa. $1,150,-000. Production of a re-entry system for ballistic missiles. Space and Missile Systems Organization, (AFSC), Norton AFB, Calif.

15—**TRW, Inc.**, Redondo Beach, Calif. $16,463,-195. Development support of the Minuteman weapon system for FY 1968. $10,390,-036. Nondevelopment support of the Minuteman weapon system for FY 1968. Norton AFB, Calif. Space and Missile Systems Organization, (AFSC), Norton AFB, Calif.

—**Lockheed Missile & Space Co.**, Sunnyvale, Calif. $1,550,000. Development improvements for the Agena space vehicle. Space and Missile Systems Organization, (AFSC), Norton AFB, Calif.

—**Avco Corp.**, Wilmington, Mass. $2,800,000. Design, development, fabrication, testing and evaluation of the Minuteman IIA re-entry vehicle. Space and Missile Systems Organization, (AFSC), Norton AFB, Calif.

18—**Kaman Corp.**, Bloomfield, Conn. $1,799,199. Replacement spare parts for HH-43 helicopters. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—**Aerojet General**, Sacramento, Calif. $5,-000,000. Manufacture of first and second stage engines for the Titan III. Space and Missile Systems Organization, (AFSC), Los Angeles, Calif.

—**AVCO Corp.**, Wilmington, Mass. $5,000,-000. Development and production of missile penetration aids. Space and Missile Systems Organization, (AFSC), Los Angeles, Calif.

—**Boeing Co.**, Seattle, Wash. $5,000,000. Installation of a UHF antenna system. Minot AFB, N.D. Space and Missile Systems Organization, (AFSC), Los Angeles, Calif.

—**Cessna Aircraft**, Wichita, Kan. $4,593,000. Produtcion of T-37 aircraft. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Control Data Corp.**, Minneapolis, Minn. $1,750,947. Rental of automatic data processing equipment at Patrick AFB, Fla. Air Force Eastern Test Range, Patrick AFB, Fla.

—**Libby Welding Co.**, Kansas City, Mo. $1,-440,884. Manufacture of generator sets (A/M32A-60). Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

—**United Aircraft**, East Hartford, Conn. $6,000,000. Work on propulsion systems for high performance strategic aircraft. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

19—**North American Aviation**, Canoga Park, Calif. $1,000,000. Overhaul of propulsion subsystems. Neosho, Mo. Space and Missile Systems Organization, (AFSC), Los Angeles, Calif.

—**General Motors**, Indianapolis, Ind. $6,002,-770. Aircraft engine development work. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Mitre Corp.**, Bedford, Mass. $16,635,000. Research and development for systems engineering and technical direction in the field of command and control systems. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass.

20—**Lear Siegler, Inc.**, Grand Rapids, Mich. $1,779,400. Manufacture of airborne computer components. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

21—**Airesearch Mfg. Co.**, Phoenix, Ariz. $1,-750,243. Overhaul services for gas turbine engines. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

—**RCA**, Burlington, Mass. $2,798,095. Development of an airborne data automation system. Electronics Systems Div., (AFSC), L. G. Hanscom Field, Mass.

22—**Emerson Electric Co.**, St. Louis, Mo. $2,-075,701. Production of automatic test equipment for F-111 aircraft. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

—**AVCO Corp.**, Wilmington, Mass. $1,423,-000. Work on a re-entry vehicle program. Space and Missile Systems Organization, (AFSC), Norton AFB, Calif.

25—**Lockheed Missiles & Space Co.**, Sunnyvale, Calif. $1,209,328. Agena launch services at Vandenberg AFB, Calif. for period Oct. 1, 1967 through Sept. 30, 1968. Space and Missile Systems Organization, (AFSC), Norton AFB, Calif.

—**Lear Siegler, Inc.**, Oklahoma City, Okla. $1,200,000. Time compliance technical order updating on C-141 aircraft. Fairfield, Calif. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

26—**Fairchild Hiller Corp.**, Farmingdale, N.Y. $1,329,500. Manufacture of modification kits for F-105 aircraft. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

—**Lockheed Missiles & Space Co.**, Sunnyvale, Calif. $1,230,301. Agena launch services at

the Eastern Test Range, Fla. Space & Missile Systems Organization, (AFSC), Norton AFB, Calif.

27—Cessna Aircraft Co., Wichita, Kan. $5,-320,000. Production of additional A-37B aircraft, spare parts and aerospace ground equipment. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Lockheed Aircraft, Jamaica, N.Y. $7,904,-629. Inspection, repair and maintenance of C-121 aircraft. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

—Chromalloy Corp., San Antonio, Tex. $1,-258,854. Repair of J-57 and J-75 engine compressor blades. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

28—Motorola, Scottsdale, Ariz. $5,556,000. Fuzes and related equipment for aircraft ordnance. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Hamilton Standard, Windsor Locks, Conn. $3,525,000. Development, procurement and support of astronaut pressure suit systems for the Manned Orbiting Laboratory Systems Program. Manned Orbiting Laboratory Systems Program Office, Los Angeles, Calif.

—Lockheed Aircraft, Sunnyvale, Calif. $3,-985,000. Engineering services in support of the Agena space vehicle program. Space & Missile Systems Organization, (AFSC), Norton AFB, Calif.

—Sylvania Electric Products, Needham Heights, Mass. $1,900,250. Preparation of technical publications for the Minuteman Ground Electronic System. Space & Missile Systems Organization, (AFSC), Norton AFB, Calif.

—Fairchild Hiller, Farmingdale, N.Y. $1,-801,492. Manufacture of fuel system modification kits for F-105 aircraft. Sacramento Air Materiel Area, (AFLC), Kelly AFB, Tex.

—Acme Industries, Jackson, Mich. $1,010,000. Manufacture of MA-3 air conditioners. Greenville, Ala. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

29—Lockheed Aircraft, Sunnyvale, Calif. $1,-500,000. Work on a satellite control facility. Air Force Satellite Control Facility, Los Angeles, Calif.

—General Electric, Cincinnati, Ohio. $6,000,-000. Work on propulsion systems for high performance strategic aircraft. Evendale, Ohio. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Boeing Co., Seattle, Wash. $2,000,000. Assembly, installation and checkout of Minuteman missiles. Grand Forks AFB, N.D. Space & Missile Systems Organization, (AFSC), Norton AFB, Calif.

OFF-SHORE PROCUREMENT

22—Canadian Commercial Corp., Ottawa, Ontario, Canada. $3,211,950. Metal parts for 4.2-inch high explosive projectiles. Toronto, Canada. Army Ammunition Procurement & Supply Agency, Joliet, Ill.

—United Kingdom Ministry of Defense, Somerset, England. $16,738,070. Construction of two salvage tugs. Lowestaft, England. Naval Ship Systems Command.

DISCO Gets New Mailing Address

The Defense Industrial Security Clearance Office (DISCO) is now receiving mail directly from the U.S. Post Office instead of through the Defense Construction Supply Center mail facilities.

Effective immediately, all mail forwarded to DISCO should be addressed:

Defense Industrial Security
Clearance Office
P.O. Box 2499
Columbus, Ohio 43216

Transit Satellite Information To Be Made Available by NSIA

In accordance with the recently announced Presidential approval to release the Navy Navigation Satellite System (Transit) for commercial use, the National Security Industrial Association (NSIA) has been provided the necessary technical information and documentation on the system's shipboard user equipment. (See item, "Navy Releases Navigation Satellite for Commercial Use," page 8, *Defense Industry Bulletin*, October 1967.)

The documents will be reproduced by NSIA and made available, on an equal basis, to any U.S. company that has an interest beginning on Nov. 30, 1967. There will be a charge to cover the cost of reproduction and mailing. The technical information and documentation consists of the following:

- Status of the Navy Navigation Satellite System.
- Present State of Navigation Doppler Measurement from Near Earth Satellites.
- Operation and Maintenance of Radio Navigation Set SRN-9.
- Program Requirements for Two-Minute Integrated Doppler Satellite Navigation Solution.
- Near Earth Satellite Handbook Data.

Requests for the material should be addressed to: National Security Industrial Association, Department T. 1030 Fifteenth St. NW, Washington, D.C. 20005.

A symposium, to present pertinent data on the respective roles of the satellite system, will be held on Nov. 30 in the Departmental Auditorium, Constitution Ave. between 12th and 14th Sts. NW, Washington, D.C. Representatives of the Office of the Chief of Naval Material, the Applied Physics Laboratory of Johns Hopkins University (developer of the satellite system), and companies presently producing Transit receivers will brief attendees.

Registration for the symposium is being handled by: John H. Jorgenson, National Security Industrial Association, 1030 15th St. NW, Washington, D.C. 20005, Phone: (202) 296-2266.

Ad Hoc Group on Concept Formulation Established

The Director of Defense Research and Engineering has established an Ad Hoc Working Group on Concept Formulation. Its purpose is to accumulate facts on specific concept formulation efforts and to recommend guidance for future concept formulations. There are tentative plans for early issuance of interim permissive type guidance, based upon the efforts of the working group.

The group will be in the information gathering and evaluation phase until November 10. Information or suggestions from individuals in the Office of the Secretary of Defense, the Military Departments, or industry regarding specific concept formulations, problems, or recommended guidance will be welcomed. These may be provided to any of the members of the working group, who are listed below:

James W. Grodsky, Chairman
Office of Director of Defense
Research and Engineering
Room 3D 1028, The Pentagon
Phone: (202) OXford 5-0075
Washington, D.C. 20301

Major George Kourakos
Office of Chief of Research
and Development
Department of the Army
Room 3C 358, The Pentagon
Phone: (202) OXford 5-4115
Washington, D.C. 20310

Commander E. D. Sullivan
Naval Material Command
Room 1207, Main Navy Building
Phone: (202) OXford 6-1541
Washington, D.C. 20360

Colonel Kenneth R. Chapman
Headquarters, U.S. Air Force
Room 5C 1080, The Pentagon
Phone: (202) OXford 5-2656
Washington, D.C. 20330

OFFICE OF THE SECRETARY OF DEFENSE
WASHINGTON, D. C. 20301

OFFICIAL BUSINESS

POSTAGE AND FEES PAID

United Kingdom Joins United States, Canada, Australia in Project Mallard

The United Kingdom has joined with the United States, Australia and Canada in a project to develop and produce a tactical communications system for the field armies of the respective nations and their associated navies and air forces.

The project, known as Mallard, will cost approximately $126 million for research and development and will require about eight years to complete.

Objective of Project Mallard is to provide secure, fully automatic, switched communications in the battlefield area from Army headquarters down to battalion level. The system will provide facilities for the transmission and reception of voice, telegraph data and facsimile.

In the initial development phase of Project Mallard, competitive system design studies will be carried out by the U.S. and U.K. electronics industries. Supporting efforts are being conducted by U.S., Australian and Canadian industrial concerns. U.K. industry will undertake a share of this work, phasing out their work in with the work being carried out in the other participating countries.

Brigadier General Paul A. Feyereisen, USA, is the U.S. program/project manager for the Mallard Project. Colonel Arthur V. Brandle, MBE, of the British Army Staff, Washington, D.C., is Project Manager for the United Kingdom. Lieutenant Colonel L. G. Moore, OBE, and Lieutenant Colonel D. C. Doughtry, CD, are the program managers for Australia and Canada, respectively.

The Mallard system will use the building-block or modular principle of equipment construction to ensure flexible inter-operation between the field armies of the four countries.

In April, 1967, the United States, Australia and Canada ratified an agreement to proceed with Project Mallard. The United Kingdom deferred participation pending decision on the sharing of costs and work. Agreement having been reached on these matters, the United Kingdom now has become a partner in the project.

AFLC To Test New Contract Logistics Support Concept

The Air Force Logistics Con mand (AFLC) will begin unique experiment in logisti support with the introduction the C-9A aircraft into the A Force inventory.

For the first time, AFLC w apply the concept of "contra support" with McDonnell Dou las Corp. providing the logisti normally supplied by AFL when an aircraft becomes oper tional. Under this concept, actu cost data will be obtained f contractor-furnished logistics.

The eight new planes—boug "off the shelf" and outfitted esp cially for aeromedical evacuati —will be operated by the Mil tary Airlift Command (MAC) the continental United States.

All eight aircraft will be bas at Scott AFB, Ill., where a logi tics support center will be esta lished by McDonnell Douglas. this center, spare parts normal furnished by AFLC will be pr vided by the contractor. Dep maintenance will be carried o by the contractor. MAC will pe form only routine organization servicing and certain "remo and replace" operations.

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DEFENSE INDUSTRY BULLETIN

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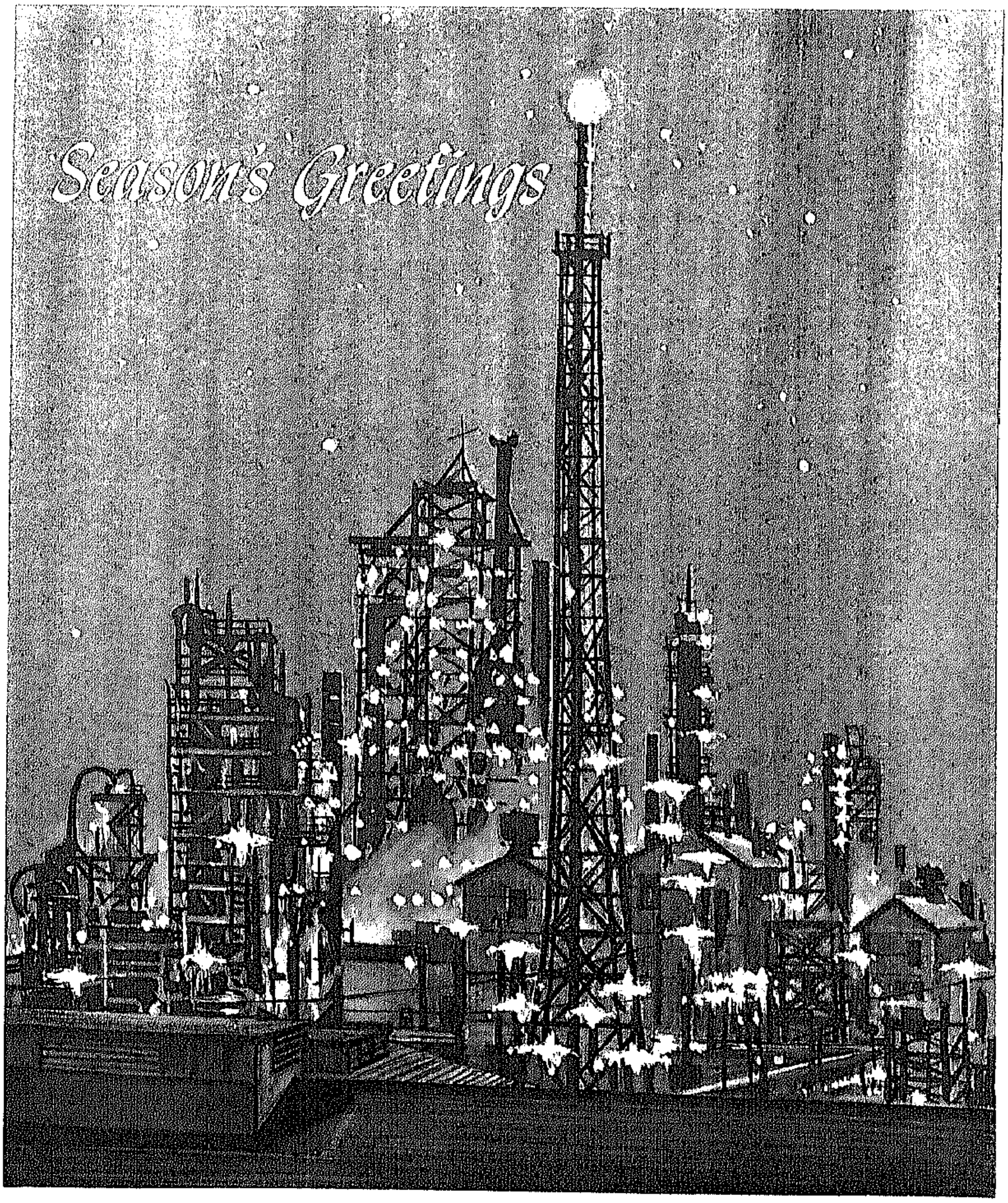

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DEFENSE INDUSTRY BULLETIN

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The Selection of Information Processing Systems To Support Air Force Management

Major James D. Pewitt, USAF
Major Richard G. Abbott, USAF
Captain Alan G. Merten, USAF

A continuing problem facing the Air Force is the allocation of resources in the acquisition of support systems. The purpose of this article is to present the methodology and thinking that goes into the selection of a typical Air Force resource management data processing system.

Before addressing the specifics of the computer selection process, the overall framework within which such decisions are made must be considered.

In DOD, each of the Military Services plans its requirements in order to meet an objective force for a specified future time period. Under the direction of the Secretary of Defense, these plans for all the Services are grouped into major program packages, such as Strategic Forces, General Purpose Forces, or Research and Development Program. There are nine such program packages which integrate requirements for men, equipment and installations, in order to achieve the greatest effectiveness consistent with the least utilization of resources in accomplishing specified national defense objectives. These are the basic building blocks of the planning process which we call programming budgeting. It has been employed in the Defense Department since 1961.

When Robert S. McNamara became Secretary of Defense, he asked Dr. Charles J. Hitch, then of RAND Corp., to assume the position of Assistant Secretary of Defense (Comptroller), in order to implement the economics of defense concepts about which Dr. Hitch had written extensively. The principal Hitch contributions to DOD were the division of planning into reasonably discrete program packages, aligned to the principal missions or responsibilities of the total Defense Department; a five-year planning period; and the recognition of interchangeability of forces and, hence, of the alternatives or options available to military commanders and resource managers in the accomplishment of particular missions. Dr. Hitch emphasized analytical techniques and the use of cost-benefit or cost-effectiveness criteria in comparisons of forces, individual weapon systems, or support systems. Thus major decisions on the acquisition of these systems and forces, as well as their deployment, are now based on studies designed to optimize mission performance and resource consumption.

It should be emphasized that whenever possible, program elements are measured in physical and financial terms. Each element must fit into the long-range objective force with regard to its input and output. This procedure forces the evaluation of a system based on a cost versus benefit analysis, and the selection of the form of implementation that is most responsive to a cost versus effectiveness analysis. Moreover, the concern is with the full cost to the Air Force of a program's investment and operation over the anticipated life of the particular system.

The critical financial decisions of each program element are based upon the normal costs of development, procurement and operations. Since there are no fixed relationships between these cost categories, investment costs and the cost of operating the proposed force or system each year, as well as the total life cost, must be known before proceeding with production and deployment. Plans are projected eight to 17 years, depending upon the lead times required for research, development and procurement. However, all other program data, physical and financial, are projected five years. This is called the Five Year Defense Program.

Requirements of ADP

This briefly defines the environment in which the cost benefit of a support system, such as improved information processing technology, must be evaluated. With an information processing technology that is rapidly advancing and continually changing, the automatic data processing (ADP) structure has been revised and modified to keep pace. The Air Force's original data automation energies were fragmented and decentralized. Major commands and functional managers developed systems, wrote machine programs, and even selected computers which were dedicated to their exclusive use. As the complexity of Air Force information systems grew, it was evident that a standard approach to the selection process was needed. The many different data systems, then in being, were developing at different rates; moreover, with the advent of the integrated program-budget approach to

planning in DOD, the need for compatible data banks and an integrated family of data systems to support general management and top-level command decision making became paramount. So, paradoxically, the Air Force had to introduce standardization, while experiencing rapidly changing data automation technology. Without standardization, all or most of the potential that data systems offer would be lost.

The Air Force has adopted the concept of standardization which improves the interface or "cross-talks" between the different data systems, as well as between and within echelons of command. Data elements and data codes, which are basic to every data system, are also being standardized.

The scope of Air Force data automation is as broad as its nature is complex. Almost all functional information systems are, or will be, automated in the near future. Trying to describe the magnitude of the program in simple terms is exceedingly difficult. For example, the Air Force now has in use approximately 1,000 computers to serve various management applications. Either this number will grow as the management information systems are further defined to meet the needs, or a new, more powerful system to satisfy the forecast demand must be provided.

The benefits to be gained from a new, more powerful system will be realized in the increased efficiency of data processing capabilities, and in increased responsiveness to the various levels of management requirements. The standardization of data processing capability will lead to savings, not only through the increased efficiency in providing information, but also in the areas of training and personnel assignments as well. The concept of modularity provides the ability to handle significant expansion of information proc- ...aving ...rs-

software specifications determined, the most cost-effective vendor proposal selected, and the optimal utilization scheme implemented. In effect, this is determined in order to make the computer more responsive to management requirements, rather than management responding to computer requirements. Concentration in the past has been on maximum utilization at the expense of providing timely management information; now the emphasis must be shifted to the needs of the manager. For this reason, the Air Force has made the general decision to move into such areas as real-time management information processing.

There has been little actual Air Force experience with many of these new computer applications. Therefore, an analysis of user requirements poses a formidable problem to determine, on a cost-effective basis, the use of real-time processing, the size of the data base, the type of storage, and the number of remotes to be provided. A cost-effectiveness analysis must be applied to each specific application in order to determine the actual requirements for this new technology in each command management area, and its interrelationship with the other command management areas.

This is an overview of the rational employed in the selection of Ai Force information processing sys tems. The specific procedures now fo lowed have been developed after di appointing experiences in procurin data processing equipment by rely ing on technical data brochures ar contractor promises of performan To avoid such experiences, the Ai Force now employes a method of se lection which in general:

- Defines for the potential vendo the Air Force requirements.
- Allows for a period of clarifica tion of the requirements.
- Demands that the vendors demo strate, at a pre-determined date, the capability to meet Air Force requir ments.
- Evaluates the performance of th various responsive vendors.

To be able to address the sour selection process in greater detail, t process will be considered from t points of view: the mechanics of t evaluation, and the necessary criter to be used in the evaluation.

ADP Selection Process

While operating within the conc tual framework previously consider

I. DERIVE OPERATIONAL USE HOURS CORRESPONDING TO 24 HR/DAY MANNING.

(OP. USE HRS/MONTH) = (MANNING HRS/DAY) (DAYS IN WORK MONTH) (MANNING FACTOR)

$$= (24)(22)\left(\frac{12}{16}\right) \approx 400$$

II. GROWTH EQUATION

$$x = a(1 + i)^N$$

X = Number of op use hrs/month
i = Growth rate/year
N = Number of years in proposed system life
a = Initial op use limit

Solve for initial op use limit

$$a = \frac{X}{(1 + i)^N} = \frac{400}{(1 + .10)^5} \approx 250$$

the formal procedure for the Air Force is defined by regulation. The major objectives of the Air Force's data processing program are:

- To increase the effectiveness of data processing capabilities and responsiveness to management requirements.

- To provide additional standardization and an integrated data processing capability to meet functional requirements, and cross-functional, general management, or command needs.

- To provide for evolutionary expansion of data systems and acceptance of new system requirements without the necessity of conversion to new electronic data processing equipment (EDPE). It should be noted that modularity does not preclude the acquisition of new EDPE when a new equipment-software system is more cost effective.

- To provide for the most economical and efficient method of satisfying approved functional management data systems requirements.

This one-step process assists the Air Force in selecting the best computer equipment in the period of time necessary to satisfy the requirements placed on the computer system. By precisely defining the user requirements and thoroughly evaluating and testing the vendor's proposals, the Air Force is able to make a selection without entering into a time-consuming, multiple-step selection process.

In order to implement these concepts, selection standards must be developed for inclusion in a Request for Proposal (RFP). These mandatory program requirements are measures which evaluate the performance of equipment submitted by vendors to accommodate requirements determined prior to the cost-benefit study.

Evaluation of Proposals

A selection plan, which incorporates the necessary evaluation criteria determined from the requirements study, is prepared and approved. Working groups, operating independently of each other, are established to evaluate each of the major criteria in accordance with the selection plan. Although the groups function independently, there is a necessary interlocking of the effects of the criteria. For example, what may appear to be a systems performance criterion is, in fact, also a cost criterion. The evaluation focuses on four basic criteria:

- Systems performance, including a live test (benchmark), to demonstrate the capability of the equipment and associated software to perform representative problems of the systems to be implemented.

- Technical characteristics, *e.g.*, reliability, interchangeability and expansibility.

- Vendor support, such as free test time, quality of documentation, and training.

- Estimated cost to the Air Force, including maintenance, one-time costs to become operational, and direct operating costs extended through the anticipated life cycle of the system.

To insure objectivity, teams of the Air Force's most qualified technical experts constitute the various working groups which evaluate vendors' performances relative to these criteria. Examples of their evaluation tools are systems simulation and measurement, and live benchmark tests.

One team has as its task the analysis of systems performance. Its function is to review and validate the timings submitted in the vendors' proposals. In addition, the team performs timing functions as members of the Live Test or Benchmark Demonstration Team. During this test demonstration, the vendor must run certain programs which have been provided by the Air Force, and which represent specific tasks to be performed by the data system.

From a knowledge of the proportion of the total workload represented by each task, the team can extrapolate to get a measure of total workload performance.

Another independent group is the Software Group. Determination is made of the responsiveness of vendors' proposed software to mandatory requirements by comparative measurement of performance through extensive analysis and live test. The next group validates the vendors' compliance with mandatory requirements, and evaluates the technical characteristics of the equipment proposed.

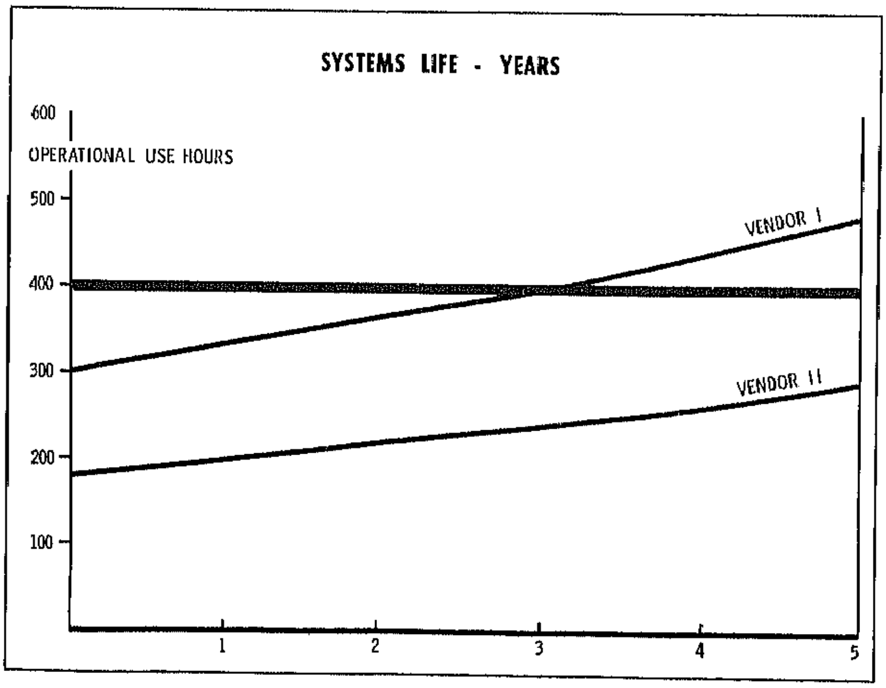


Figure 2.

A fourth group is the Vendor Support Group which validates the program test time, the completeness of manuals and documentation, and necessary maintenance support. The fifth and last group is the Cost Group. This group reviews the cost proposals to insure completeness of the RFP, validates the cost compilations submitted by the vendors, and develops a detailed cost analysis.

A cost-effectiveness comparison is made on the systems which are proposed by the responsive vendors. Further refinement in the comparison of successful vendors can be accomplished by using methods to maximize the effectiveness of the proposed equipment under the constraints of the RFP. This is done since our management system requirements are increasing exponentially, and it is imperative that the highest possible degree of flexibility and performance be maintained. Various techniques from the field of operations research are useful in determining the flexibility and capability of these systems. Each of these stages in the selection process addresses the planning or requirements part of the programming and budgeting cycle mentioned earlier.

The combined technical findings of the working groups are then presented to a Source Selection Advisory Council, consisting of general officers, senior colonels and civilians. The council, after weighing the technical findings, arrives at a source recommendation which must be concurred in by the Chief of Staff before being submitted to the final source selection authority for approval. The review panels are not aware of the identification of the specific vendors while they are evaluating the benchmark test data or the technical specifications of the proposed systems.

Mandatory Requirements

In order that the hardware and software capabilities meet the major requirements of the management information systems, the mandatory requirements are included in the RFP. Examples of these are:

- Necessary software requirements.
- Training of personnel, programmer support and follow-on maintenance.
- All system components proposed, including expansion requirements, must have been formally announced for market purposes, and the live test demonstration must be performed successfully.
- An hourly operational use time limit, where operational use time is defined as the number of hours per month that the machine must be in operation to accommodate the defined workload. This criterion puts an upper bound on the time a vendor's system may take to process the initially defined workload in the RFP.

Hypothetical RFP

What are the implications inherent in imposing a mandatory requirement on operational use hours per month?

Consider a hypothetical RFP. The operational use hours criterion would be derived from several factors. First, the workload growth rate in the RFP will be based on a 10 percent rate that has been derived from past experience with batch processing, and will be used across the board for both batch and real-time processing. It has been determined from experience that it takes two shifts—16 hours—per day to support an operational use time of 12 hours per day. In addition to these two factors, it is required that there be no necessity for systems expansion over the estimated five-year life, or conversely, that the manning hours remain under 24 hours per day throughout the life of the system. Within these constraints, it is possible to derive a 250-hour limit on the operational use time initially required to support the anticipated workload. (See Figure 1.)

To illustrate the application of the 250-hour criterion, two vendors replied to the hypothetical RFP. Vendor I exceeded the 250-hour limit, while bidding a $35 million system. Vendor II, on the other hand, performed substantially below the 250-hour ceiling and bid a $45 million system. In order to compare the two vendors cost effectively over the five-year system life, one aspect that must be considered is the effect the growth rate will have on each vendor's system.

Initially, a 10 percent growth rate was considered for both batch and real-time processing to investigate the effects of system's growth. Consider

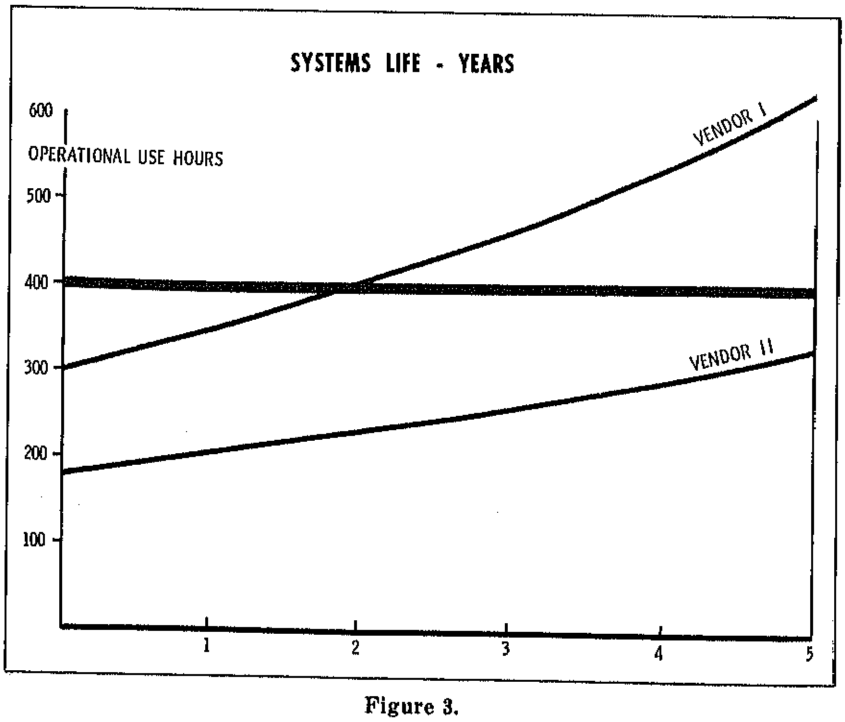


Figure 3.

Vendor I (Figure 2), who starts at 300 hours, a position 50 hours above the 250-hour base line. By the third year, he has broken through the 400-hour ceiling implying that the system is manned 24 hours a day and any further expansion of workload requires new equipment. By the end of the system's life in the fifth year, it can be seen that Vendor I requires 480 hours per month to process the workload, a manning factor of 29 hours a day.

Vendor II, however, has bid a more expensive, but more powerful system which starts at a point 70 hours below the 250-hour base line and never does break through the 400 hour ceiling. In addition, he is able to process the workload in 60 percent of the processing time required by Vendor I. Vendor II is 40 percent more effective than Vendor I.

Parametric Analysis

Since there has been little actual experience in the Air Force with real time systems, a very conservative growth rate of 10 percent was assumed. It should be realized that real-time growth rate is an area of uncertainty and concern and, therefore, deserves further analysis. The ability of each of the vendors to meet future requirements placed on the computer system by the addition of new, real-time systems must be determined. In order to do this, a parametric model is used in which the growth of both real-time and batch processing can be varied. By increasing both areas at different rates, a more precise idea can be obtained of the flexibility of each vendor's system.

For example, on one trial the historical 10 percent growth rate was assumed for batch processing, while a 20 percent growth rate for real-time processing was used (Figure 3). In this case, Vendor I breaks through the 400-hour ceiling in two years, requiring equipment acquisition at that time. By the end of the fifth year, 625 operational use hours per month, with an associated 39-hour manning factor, are required to process the workload.

Vendor II, however, is never in trouble even at the increased rate of growth for real time systems, requiring at the end of the fifth year 332 operational use hours per month with a manning factor of 20 hours per day. Vendor II can now accomplish the job in 50 percent of the time required by Vendor I.

To return to the 10 percent growth rate used in developing the hypothetical RFP, the cost factors implicit in the total system's life must now be considered (Figure 4). The bidding prices for the two systems, which include maintenance up to the 250 operational use hours, were $35 and $45 million for Vendors I and II, respectively. Additional costs due to operations and maintenance above the 250 hours amount to $1 million for Vendor I, and $.1 million for Vendor II. These costs for the hypothetical system were based on an assumed factor of $.1 million per additional 100 hours of manning. Acquisition of equipment to handle a workload over 400 operational use hours would require an estimated additional $8.6 million. There would be an estimated $.5 million cost for installation. Therefore, at the end of the five-year system's life, we have Vendor I with a total system's cost of $45.1 million, and Vendor II with a total cost of $45.1 million.

At the end of system's life the total costs are at equal levels under the assumed 10 percent growth rate. Previous analysis showed that Vendor II is at least 40 percent more efficient.

The 250-hour limit criterion then is one important measure which enables the Air Force to acquire cost-effective systems. However, it is not only a measure of overall system effectiveness, it can also be used as an input to further analysis.

Cost Benefit of Satelliting

One possible approach in this type of analysis is to consider extending the remote capability of our equipment to permit satelliting. Satelliting consists of placing a large central processing unit at a centrally located Air Force installation, and processing the workload of various smaller installations on the centrally located processing unit through the use of telephone lines and remote peripheral equipment.

If one base is satellited on another, the cost of the central processing unit on the satellited base is avoided, but there are incurred costs of communication lines between the host and satellite, and of special peripheral equipment required at the satellited installation. A cost versus effectiveness analysis determines the feasibility of satelliting and aids in the selection of the optimal allocation of hosts and satellites.

	VENDOR I	VENDOR II
BID	35	45
ADDITIONAL OPERATION AND MAINTENANCE	1.0	.1
EQUIPMENT ACQUISITION	8.6	--
INSTALLATION	.5	--
TOTAL SYSTEMS COST	45.1	45.1

COSTS IN MILLIONS OF DOLLARS

Figure 4.

In implementing the satelliting concept, it is necessary to designate the large centrally located installations as hosts, then propose configurations to place on these hosts, and finally select the satellite bases to be supported by each host installation. The objective is to satisfy the processing requirements of each installation and to do it at minimum total cost.

The processing requirements of each installation can be determined from an analysis of the anticipated workload data. From the operational use hour limit derived in the previous analysis, it is possible to determine the number of day and evening hours available per day. The workload data provide the number of real-time transactions to be processed on each installation per day. From this, the number of hours of real-time processing can be computed. The workload data also supply the necessary information on the requirements for batch processing, both concurrent and nonconcurrent. Nonconcurrent processing is that which has to be accomplished after the real-time period, since the reports generated might query the status of the data banks used in the real-time process. The total processing requirements are then determined from the sum of the batch concurrent, batch nonconcurrent, and real-time requirements. The number of remotes required at each installation can be determined from the location of organizations requiring immediate access to the computer, the number of real-time transactions, and the response time required on each transaction.

The evaluation of each of the possible alternatives is infeasible in large problems because of the numerous combinations of hosts, satellites and configurations. The derivation of an analytic technique to find the optimal allocation procedure proves to be not only impractical but unnecessary. Policy requirements designate certain installations as hosts and influence the size and capability of the configuration for these installations. The capability and reliability of communications equipment limit the number of host possibilities for each satellite. Nevertheless, it is still necessary to select the optimal allocation of satellites, constrained by the amount of excess computer time available at the hosts. Within these constraints, the satelliting scheme, which corresponds to minimum total systems cost, will be selected. Systems cost is here defined as the sum of the configuration costs plus the total cost of satelliting.

Selecting the Optimal Satelliting Scheme

In order to determine the cost of implementing the concept of satelliting, the analyst begins by dividing the set of installations into smaller subsets. This division may be imposed by policy requirements or by natural constraints, such as the reliability of communications equipment. Each subset can then be considered as a separate problem to be suboptimized.

For each subset of installations, the analyst will designate certain installations as hosts and determine the configuration to be placed on the hosts. At this point, an analytic technique must be derived which will determine the optimum allocation of satellites to hosts for each subset of installations. Any model developed must provide for constraints on real-time, batch nonconcurrent, total processing, and remotes for each host. The system is also constrained by the fact that each satellite must select one and only one host. Within these constraints, the object is to minimize the total cost of satelliting. The allocation of satellites to hosts that corresponds to minimum cost may be determined through the use of the mathematical analytic techniques. For

Major James D. Pewitt, USAF, is Special Assistant for Economic Analysis to the Assistant Secretary of the Air Force (Financial Management). He holds masters degrees in business administration and in operations research, and a doctorate in business administration from the University of Southern California.

Major Richard G. Abbott, USAF, is a mathematician assigned to the Air Force Data Services Center. He received a bachelors degree in mathematics from Trinity College in Hartford, Conn., in 1956. He also holds a masters degree in mathematics (computer science) from Stanford University.

Captain Alan G. Merten, USAF, is a mathematician assigned to the Air Force Data Services Center. He received a bachelors degree in mathematics from the University of Wisconsin in 1963. He also holds a masters degree in mathematics (computer science) from Stanford University.

each subset of installations, the total cost of the program is the cost of the configurations at the hosts, plus the satelliting cost incurred for each satellited installation.

It is obvious that through this analysis, the effect of assigning different configurations to the host bases can be determined, in addition to evaluating the effect of changing the division of satellites and hosts. Finally, the initial scheme used to subdivide the installations may be changed and all of the aforementioned parametric tests performed again. This type of model may be used to test the relative cost effectiveness of two configurations of the same vendor or similar configurations of different vendors. Parametric studies, which vary the constraints on the processing equipment variables, will determine the effect of changes in workload on the total system's cost.

From this type of analysis, the most cost-effective satelliting scheme can be determined. Since these are utilization costs that must be considered in the total analysis, they will be used in estimating the total cost of the computer equipment to the Air Force.

Cost-Effectiveness Techniques

The consideration of this type of analysis shows a different facet of the 250-hour criterion. A firm measure of operational use hours is a valid criterion, and is extremely useful as an overall measure of performance in cost-effectiveness studies. As a mandatory requirement, this criterion has major analytical implications and is critical to the one-step selection process. If it were ignored, then the relative merits of life-cycle costing would be difficult to achieve. This is true because of the nature of cost-effectiveness analysis. These mandatory requirements are measures of effectiveness by which comparisons may be made, and the criteria are then measures of merit or benefit.

In this review of the source selection process, consideration has been given to just one part of the analytical process which is necessary to provide useful information to the decision makers. Another complication, which might have been introduced to the preceding analysis, would have been the consideration of a discount rate on a lease versus buy analysis as a function of the rate of growth of the management system's requirements. The one-step selection process makes careful analysis imperative, and demands that mandatory requirements be met in full by the vendors.

This article has centered on the cost-effectiveness evaluation performed in the source selection process. It has also considered satelliting as an example of a suboptimization technique. When complete, the total process, including the results of the live test demonstration and the various analyses, is then evaluated and submitted to the Source Selection Advisory Council for recommendation on the selection. The council must determine if the vendors' proposals were evaluated in a consistent manner, and advise the source selection authority as to which proposals are within the competitive range. Its recommendations are presented, through the review process, to the source selection authority to assist in his decision.

Reasons for One-Step Selection

Many questions are raised as a result of the rigorous analysis performed during the one-step evaluation process. The Air Force established these procedures and laid down these rules because of unfortunate experiences in the past with
deemed promises of tech
formance. The curre
curement procedure
as a result of these
participant is judged objectively and fairly in line with the rules set forth well in advance of the deadline for submission of proposals. Judging from previous electronic data processing equipment selection experience, a multiple step technical evaluation allowing for extended negotiation and correction, followed by price competition and selection, has the character of a paper competition. It provides promises of technical accomplishment and performance, rather than demonstrable evidence that contractual definition of requirements is fully understood and can be met. Air Force experience in this type of competition has been disappointing, both in product and service provided, and in ultimate price paid. Since the desired implementation dates have been determined by our commanders' and managers' needs and are part of the overall Air Force planning process, any significant delay may degrade the Air Force's capability to perform its mission.

For these reasons, the Air Force has selected the benchmark approach, with the RFP stipulating both mandatory requirements and a definitive time limit for meeting these requirements. Under this one-step selection process, all vendors have an equal chance, as required under the competitive procurement law.

Summary

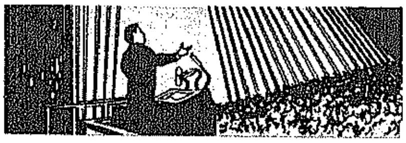
Certainly, there are lessons which could be gleaned from the discussion in this article. First, the lowest bidder, in terms of initial procurement costs, may not necessarily be the winner. However, a competition run on the basis of life-cycle costs does not depart from the rule that contracts must be awarded to the low bidder. The initial low price bidder is not necessarily the low system bidder when costs, other than initial acquisition price, are taken into account.

There is obviously a major impact on both the engineering and sales practices of the suppliers. Also, these costing techniques require data

most advantageous to the U. S. Government, price and other factors considered.

One of the many methods of dealing with this selection process is to submit more than one system in response to a given RFP. In fact, a vendor could submit a series of hardware/software combinations, each a bit more powerful and expensive than the previous to a point where the performance is well above requirements. Thus the vendor would have so bracketed the combination of technical performance and cost as to be

(*Continued on Page* 23)



FROM THE SPEAKERS ROSTRUM

Address by Hon. Robert A. Frosch, Asst. Secretary of the Navy (Research & Development), to the 1967 Electronics and Aerospace Systems Technical Convention, Washington, D.C., Oct. 17, 1967.

F-111B Development

Today I will discuss the technical status of the F-111B and in particular some aspects of its development during the past few years. In order to clarify its current status, I will begin with an account of Navy aircraft test procedures as they relate to development philosophy.

In order to be certain that difficulties in the development of an aircraft are identified for correction as soon as is possible in the development cycle and to assess the basic aeronautical qualities of the airplane, the Navy has its own test pilots fly a sequence of tests called Navy Preliminary Evaluations (NPE). Five such flight series are normally flown. These are not, in any sense, acceptance tests, but rather are intended to identify problems and potential problems very early in development so that they may be corrected. The test pilots try to find all the problems they can, regardless of how minor they might be. They comment only on the plane actually flown; it is not their responsibility to, and they do not try to, identify ways of correcting the problems they find, nor do they usually speculate on the prospects for doing so.

The test articles, used for acceptance of the aircraft at the end of development, are flown in a sequence of trials run by the Navy Board of Inspection and Survey (BIS). It is only these BIS trials that can be described as acceptance tests.

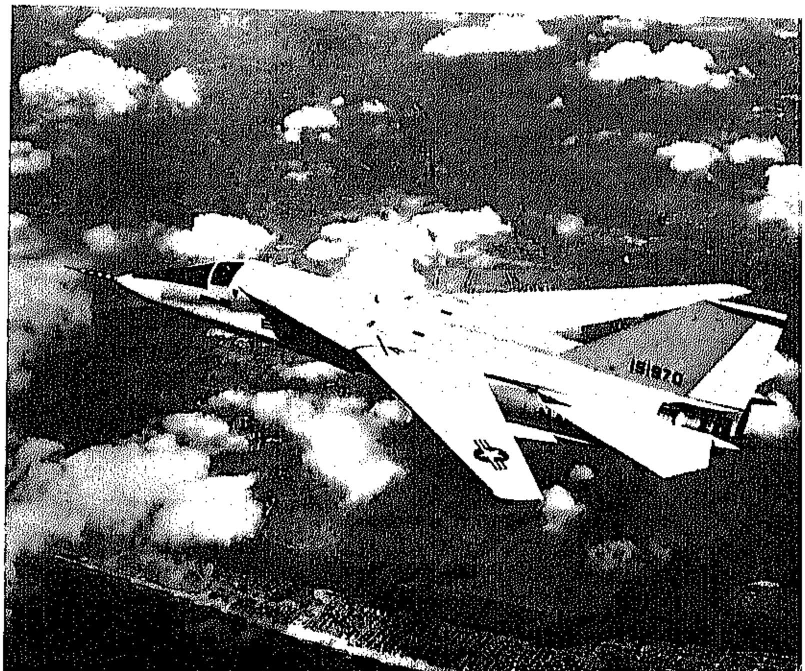
The Navy test pilots, who fly preliminary evaluations, are an extremely competent, professional and dedicated group of men. We are proud of them and delighted with their hard-nosed attitude which, by early identification of problems, has saved the Navy a tremendous amount of trouble.

The NPE report is intended for the test agency, procuring agency, and contractor. The professional airplane developers, in each of those organizations, recognize the special nature of the report for its intended use as a management tool to expedite corrective action, if considered necessary by the procuring agencies. The procuring agencies are aware that the test agency writes the report, based on the test article at the test time, without regard for corrective action which may already be approved, but has not yet resulted in hardware changes. It is the responsibility of the procuring activity and the contractor, not the test activity, to initiate corrective action or to determine, as often happens, that none is required. The report is not generally intended for public or Congressional use. It is written for professional use without the explanations and qualifications, which are understood by the aeronautical professionals, but should be added if it were intended for a wider audience.

Recently there has been considerable hubbub in the press and (gress over comments extracted f a recent F-111B Phase I NPE. \ ious newspapers, in articles editorials, have commented on tl Phase I NPE results. Remember t a Phase I NPE is purposely pl as early in development as the plane can be flown, in order to p vide for early detection of diffi ties.

To convey to you the "flavor" such a Phase I NPE report, I w like to quote from such a report. ' following are excerpts from a list deficiencies characterized as "cor tion mandatory:"

- "Inadequate lateral control ef tiveness in configuration Power . proach (the configuration of aircraft during carrier landings) normal approach airspeeds.
- "General airframe buffet in c figuration Power Approach.
- "Unreliability of afterbur lightoffs with JP-5 fuel above 35,(feet.
- "Windshield distortion in the cinity of the stress strap and the sultant restriction to forward fi of view.



F-111B Aircraft

• "The excessive distance between the pilot and the control stick.

• "Slow longitudinal trim rate.

• "Inadequate damping of residual directional oscillations.

• "Inadequate stall warning in configuration Power Approach.

• "Nose wheel shimmy.

• "Random engine exit nozzle opening and closing when modulating at minimum afterburning.

• "Location of the speed brake and microphone switches."

Quoting from the same report, in the section relating to prospects of meeting contractual guarantees, ". . . the following guarantees will probably not be met or their attainment is questionable:

• "Time to accelerate from maximum velocity at military rated thrust to 1.2 IMN at 35,000 feet.

• "The specific range at 40,300 feet.

• "Subsonic combat rated thrust combat ceiling.

• "Maximum velocity at military rated thrust at 35,000 feet.

• "Time to climb to 35,000 feet using combat rated thrust."

These quotes add up to an airplane which, unless modified, would give pilots at least considerable difficulty in carrier landings, if they could be made, and an aircraft with some real problems in combat flight. The quotes I have just cited are not from the recent F–111B NPE; they are, in fact, from a Phase I NPE of the F–4 fighter plane conducted in the fall of 1958. There were also a number of complimentary remarks about the aircraft and its other flight properties. After those remarks were made, the F–4 proceeded through the other phases of development, passed its BIS trials, and was introduced into the Fleet in December 1960. It has performed well there, is recognized as the best fighter available in the free world today, and the basic design has been applied to Air Force variations which are today being purchased in greater numbers than Navy versions. We, therefore, have a clear example of the flavor of a Phase I NPE which, if quoted out of context, could indicate a bleak future for the F–4. With hindsight, it is evident that the F–4 future was considerably better than the quotations above would indicate because the NPE comments assisted in the achievement of this successful weapon system.

Relative to the F–111B, the general concept of commonality itself was not really a new or foreign thought. We have proven in the F–4 program that Air Force and Navy airplanes, with similar mission requirements, can be successfully used by both Services. We have recognized within the Navy the desirability of commonality and have pursued it in such programs as the A–1 Skyraider.

Commonality Not a New Concept

It was produced in attack versions, airborne early warning versions, electronic warfare versions, and utility versions. We have demonstrated economies in the S–2, C–1 and E–1 airplane families by common engines, common subsystems, and nearly common airframes for different missions. We are today pursuing that logical course of action utilizing the basic A–6A design to create the EA–6A and, with further variations, the EA–6B. We are considering a tanker variation of the same airplane, called the KA–6D. All of these examples are given to emphasize that the basic concept of airframe, engine and avionic commonality, leading to variations of the same airplane with different uses, has long been recognized and understood within the Navy.

The design of the F–111B was challenging, but the variable sweep wing and afterburning turbo-fan engine made it appear possible to incorporate, in the same design, characteristics necessary to meet both Air Force and Navy requirements. This was a somewhat more radical approach to commonality than had previously been tried, and one which put rather more severe problems on the shoulders of the initial design engineer. The contractor analyzed designs for each small element that were essentially three designs; one to meet only the Navy requirements, one to meet only the Air Force requirements, and the third as the best way of satisfying both requirements. Because of the magnitude of the development and the ever present publicity attendant in this program, the contractor designed so as to insure that each new feature would indeed perform as planned, and that neither Service would find its requirements neglected.

Confronted during manufacture of the first three aircraft with the inescapable conclusion that the aircraft would be heavier than desired, the contractor initiated a massive redesign effort which has been described as the Super Weight Improvement Program (SWIP). This redesign, effective at F–111B number four, was instituted before the first Navy aircraft was delivered. The first three aircraft were in fact overweight, and much heavier than number four, approximately 3,000 pounds heavier. It is useful to ask whether the first three F–111B aircraft (which were known to be unrepresentative at the time of their acceptance) were a waste of money. As a matter of fact F–111Bs numbers one through three are in active use today as avionics and Phoenix test beds. All of these tests are required and all of the aircraft are usefully occupied. Accepting no F–111B aircraft until the first SWIP version was available would merely have delayed the avionic and Phoenix testing without improving the program. The weight of the aircraft is of little importance for this testing, but other basic properties and shapes are important to it.

The redesign effort produced the weight-improved, or so-called SWIP airplanes, F–111Bs number four and number five. We immediately utilized Navy number four as the demonstration airplane to validate, with contractor pilots, flutter and structural qualities of the SWIP design. While number four F–111B opened the permissible flight envelope, number five was prepared for a Phase I NPE essentially as if it were a new aircraft. Before this NPE there were many known F–111B characteristics and problems based on the flight testing of the pre-SWIP airplanes. In spite of the SWIP effort, prior to the NPE date, we had determined that higher thrust engines and other configuration changes would, in all probability, be necessary. However, the Navy desired a new and independent evaluation of the airplane which was much more representative of the expected end product of the research and development effort. The NPE was conducted, as always,

on the hardware available. Improvements required and designed for later airplanes, but which were not yet incorporated in the test aircraft, were not considered.

Examples of deficiencies that were found in that F–111B NPE, and which were termed "correction mandatory," are quoted as follows:

- "Unsatisfactory lateral-directional handling qualities in the high-lift configuration with Adverse Yaw Compensation which degrade the night shipboard recovery capability.
- "Repeated occurrence of afterburner blowout and unsuccessful afterburner selection at conditions well within the NPE operating envelope.
- "Inadequate pilot's external field of view at the guaranteed minimum usable approach speed.
- "Unacceptable feedback of the Stability Augmentation System in the primary flight controls.
- "Unsatisfactory characteristics associated with extended speed brake operation.
- "Inadequate taxi turning capability for carrier operations.
- "Low excess thrust for acceleration from loiter flight conditions with maximum afterburner.
- "Unsatisfactory airplane tip-back characteristics.
- "Inaccessible location of the Control System switch which incorporates standby gain provisions.
- "Lack of fire extinguisher in the crew module.
- "Susceptibility of the crew module escape system to damage by personnel stepping on the wing glove area of the module. (The approved walkway areas are not adequately delineated. Existing 'NO STEP' markings are sporadically placed and confusing.)"

From the same report the following recommendations and conclusions apply:

- "Extensive simulator evaluation of the F–111B cockpit with the complete weapon system's displays and pilot's primary flight displays is essential to determine the suitability of the cockpit design concepts.
- "Supplementary solutions to eliminate multiple images in addition to increasing windshield incidence should be investigated.
- "The windshield 'critical area' should be redefined in accordance with carrier visibility requirements vice Air Force optical gunsight requirements."

If you recall the list of F–4 NPE problems I went through earlier, you will find some of these familiar.

Within the same report, as in the case of the F–4 report quoted before, estimates of the probability of meeting contractual guarantees indicated some would probably not be met. Because of the timeliness and classification involved, I prefer not to discuss the exact details.

The question which immediately comes to mind is, "How serious are these comments?" Analysis of them indicates that they range from easily corrected minor problems to limitations that may persist to some degree despite our best efforts.

How Much Correction Is Enough?

The problems we face in deciding exactly how much correction is enough are more complex than might appear at first look. For example, we all agree that the pilot should have a good view over the nose of the airplane in order to effect a carrier landing. (This has been a perpetual problem; some aircraft used to approach the carrier almost sideways for this reason. The F–4U, or Corsair I, was a classic example of this.) In the F–111B we found problems with the industry standards in defining precisely where the eye of the 5 to 95 percentile pilot should be in order to insure adequate vision. In order to define a satisfactory "fix" for this problem, we had to discard the industry standard, which was misleading, and substitute a more stringent one.

Another example is the standard geometric description of the tip-back tendency, which relates the airplane center of gravity to the deck contact point of the main wheels. We find that variations in braking ability and aircraft inertia characteristics, in actual practice, require us to modify the simple geometric definition of what is a usable tip-back configuration.

Our experience with the F–111B is giving us new insights into the writing of specifications for aircraft. It must be remembered that, at best, a specification is only a capsule description of what we want; some numbers extracted from a vast mass of qualitative and quantitative desires.

At this time, we have the following corrections which will be in succeeding Navy F–111Bs in engineering design:

- An improved engine to provide additional thrust throughout the flight envelope. This engine is designated the TF–30–P–12 and will be in F–111B number six and subsequent aircraft.
- A visibility improvement package which raises the pilot's seat, modifies the windshield angle, and increases the flap deflection, all three working in concert to improve over-the-nose visibility during landing. The flap fixes will be incorporated at Navy number six, with the cockpit changes introduced at Navy number eight and retrofitted to Navy number six.
- A redistribution of weight and a movement of the landing gear aft which will improve the present tip-back properties of the aircraft. An extended nose will be in all aircraft after Navy number six. The landing gear modification will be effective in Navy number eight with simple retrofit to Navy number six.
- The extended nose, referred to above and introduced to improve weight distribution, will be used to house the Phoenix airborne missile control system in a more accessible location. At the same time the volume, previously occupied by the Phoenix and other avionics, has become available and permitted installation of an additional 2,000 pounds of fuel. This change will be effective in Navy number six. The additional fuel provides increased loiter time.

The point most often raised in Congress and most media releases is whether the aircraft is indeed carrier suitable. Carrier suitability could be defined as the appropriateness of the vehicle to exist in the carrier environment. Obvious questions, such as adequate deck strength, have been considered, and there is no problem in the supercarriers from which we expect to operate the F–111B. The elevators in the Forrestal and subsequent carriers are updated as all aircraft loads increase, and are expected to create no problem at

fleet introduction with the weights anticipated. The updating of elevators in these carriers was undertaken and is being carried out for reasons that are fundamentally independent of the F–111B. A program of catapult improvements in Kitty Hawk and subsequent carriers has been carried out to improve their capability to handle all aircraft at lower catapult wind-over-deck. These improved catapults will constitute the majority aboard the intended carriers at fleet introduction of the F–111B. The capacity of the remaining catapults, cited in the original F–111B specification, will also be adequate to handle the aircraft.

Is F–111B Carrier Suitable?

The previous properties cited have been carrier characteristics necessary to match airplane characteristics. Directly associated with them are the airplane characteristics to match the carrier. The variable sweep wing has its most obvious advantage in landing and takeoff, and is an important innovation in the F–111B. Because the energy requirements to catapult or arrest are concerned with kinetic energy in which, of course, the veolocity enters as the square while the mass enters linearly, the low-speed landing and takeoff characteristics of the F–111B, due to the high lift in the wing-forward configuration, more than adequately compensate for the increased mass. Comparable weight carrier aircraft, such as the RA–5C and A–3B, do not benefit from this feature and, thus, impose higher loads on the carrier when operating at equivalent mass to the F–111B. The F–111B is expected to land and takeoff at speeds about 15 to 20 knots less than the F–4 and RA–5C.

Curiously, the success of this high-lift feature has created a problem. The airplane has sufficiently high lift and low drag and speed in the landing configuration that on the glide slope the engines have had to run very near idle, with the result that the response of the aircraft in this state is too sluggish. A few minor changes appear to be sufficient to correct this problem.

We are preparing to take F–111B number five aboard an aircraft carrier sometime during the spring of 1968. While we are aware of shortcomings in that specific aircraft, which will be corrected in succeeding airplanes, we believe it is necessary to test the F–111B in its intended environment as soon as possible. There is no substitute for appropriate full-scale testing in any development program. This testing will not commence until laboratory structural tests (now scheduled on a test article in November) and land-based tests, using catapults and arresting gear installed at Naval Air Station, Lakehurst, N.J., and Naval Air Test Center, Patuxent River, Md., are complete. The latter testing is scheduled to start in January 1968. Thus we are building up to initial carrier trials in our usual straightforward and careful manner.

About a year later than the initial trials with F–111B number five, a production-representative aircraft, with all the fixes I have previously enumerated, will conduct more involved and complete carrier tests.

As I discuss the F–111B airplane today, we are more than two years away from the BIS trials which I referred to earlier as the true acceptance trials. We have many engineering changes to be incorporated, many development steps to be taken, and much more quantitative flight testing to be performed to perfect the configuration. There will be other NPEs embracing a larger flight envelope and more internal components of the complete weapon system. Of course, the testing to date has established a high probability of acceptability of the basic aerodynamic qualities. After the contractor demonstrations and NPEs are complete as prerequisites to BIS trials, some four or five uninstrumented production airplanes will be designated as BIS aircraft. They will be tested at the Naval Air Test Center, Patuxent River, Md., and the Naval Missile Center, Point Mugu, Calif. At about the time those trials are in progress, another set of production-representative aircraft will be assigned to the Operational Test and Evaluation Force (OPTEVFOR). The OPTEVFOR airplanes will be used to develop and refine the tactics the Fleet will use when operating the F–111B/Phoenix weapon system.

At the end of BIS trials, delivery to the Fleet will begin with initial deliveries to a Replacement Training Squadron. From that squadron, in due course, will come the trained personnel to man the first deployable fleet squadron.

The fleet introduction, described above, will take place within the year following BIS in the configuration established during development, and proven acceptable in the BIS trials.

Mission Capability

Having discussed the suitability of the aircraft and its state of development, I will address its mission capability. The Navy mission capability for the F–111B has always centered around the long-range missile carrying and multiple missile firing capability of the airplane/missile combination. The Navy requirements, as they were conveyed in specification form to the contractor, detailed five design missions. The first of these was the fleet air defense mission which is still our primary mission. The second of these employed the Phoenix in a distant air superiority role, such as over a beachhead. The third, fourth and fifth missions capitalized on the long-range performance of the airplane to deliver nuclear and conventional bombs. We expect the aircraft to be capable of performing the fleet air defense mission as defined, and capable of performing flight to a distant beachhead area where, supported by appropriate Marine Tactical Data Systems or Airborne Tactical Data Systems, it will provide an effective distant air superiority capability.

While the remaining missions which deliver nuclear and conventional bombs can be performed by the F–111B, they have become less important Navy requirements for the F–111B.

With regard to the fighter role, we must begin by considering what a fighter is. This is a current problem. The concept varies from Snoopy and Red Baron (with white scarf trailing out behind, as in the Peanuts comic strip) through something in order of the YF–12 Mach 3 fighter, proposed for continental air defense.

The letter "F" in the military airplane designation simply means fighter, and we use that designation for fighter bombers, some of which are intended for traditional dogfights, and some not.

Limited-range fighters, such as the F–5A, and extremely long-range fighters, such as the F–111A, have considerably different characteristics. The F–111B was designed to fill the fleet air defense role which is essentially the fighter interceptor role. In such a role, it is supported by systems, such as the Airborne Tactical Data System (now carried in the E–2A), the Naval Tactical Data System, and the Marine Tactical Data System when near a beachhead. Assisted by these tactical data systems, it performs more nearly a function corresponding to that of the fighter interceptor in the Continental Air Defense Command, which operate under guidance of numerous control nets.

In 1966 the Chief of Naval Operations conceived a study of the F–111B in its primary fleet air defense role as an interceptor. The aerodynamic characteristics of the assumed fleet F–111B aircraft were purposely viewed in a pessimistic manner, compared with both contractor-supplied characteristics and the original specifications. The F–111B/Phoenix was compared with the Phoenix system carried in subsonic aircraft, with other fighters with other missile systems now visualized for the appropriate future era, and with variations of those other fighters which showed promise. The study employed the latest in dynamic simulator techniques, and used a base of knowledge about this aircraft and competing systems which we have established over many years.

It was the finding of this elaborate formal examination of the problem, and the judgment of the Naval officers who ran it, that the F–111B/Phoenix system, on a deck-space and cost-effectiveness basis, was a better system for the fleet air defense role than any comparable system which could be introduced in the same time frame. We feel confident that this study has indeed shown, as well as anything but operating experience can, that this airplane, equipped with its Phoenix missile system, will provide effective fleet air defense, and will meet the military requirements that led to its development, even if it does not meet all of the specifications that were the contractor's guaranteed estimates of what the aircraft would do. The relative cost-effectiveness advantage of F–111B/Phoenix over competing systems is greatest for the more serious threats to the Fleet. For lesser threats, the requirement for a complex fleet air defense is smaller and the other systems become more competitive. However, we find it necessary today, as in the past, to plan for threats which the potential enemy is capable of launching, and this must include the serious and sophisticated threats.

We have treated this Chief of Naval Operations study to sensitivity analyses for possible degradations in aircraft performance and modifications in cost. When all the elements of predicted 10-year operating costs, deckspace allocation, and effectiveness against threat (including variations up to the highest threat that we believe could be mounted) are considered, we find that it meets our fleet air defense requirements better than any competing system available for study.

It now appears inappropriate to consider the F–111B as competing directly with the subsonic A–7 carrying conventional bombs. We are examining instead the possible employment of the F–111B as a missile platform in attacking with air-to-surface missiles with large stand-off ranges. In this role, its potential as a well equipped avionic platform with excellent performance, and its ability to return and land with unexpended expensive missiles provides advantages that none of our other aircraft can match. We have not yet

Hon. Robert A. Frosch

completely defined this new secondary role for the aircraft which, in any case, would require the airplane to use stand-off missiles that have not yet completed development nor reached the Fleet.

In summary, we gave the contractor (and he accepted) a very tough requirement to meet, if he was to provide all the performance desired by the Navy and by the Air Force in the designs he initiated. As we examine the situation some years later we find that the aircraft will probably not meet all of the initial specifications, and the contractor will have to accept some responsibility for this lack. It is, of course, not unusual for a military aircraft that uses advanced state of the art to fail to meet some of the specifications. The real question is whether it meets military needs. We have examined whether the F–111B continues to meet the original primary military mission requirements, and we are convinced that, in its primary air defense interceptor role, the F–111B, equipped with the Phoenix airborne missile control system and firing multiple shots of the long-range Phoenix air-to-air missile, represents the finest fleet air defense system available in the immediate future.

The F–111B is now in the state of development where we are satisfied that the basic problems have been solved, and that we have identified other design problems for which solutions are in progress. The overall success of an airplane is determined over the long run by how the system meets a solid military requirement. We are heartened by the fact that the Air Force now appears to be bringing its version of the F–111 into the operational inventory in a highly successful manner.

We base our expectation that the F–111B will be a satisfactory, carrier-suitable aircraft for its mission partly on the fact that corrections for the deficiencies, discovered in the first serious flying of its development, have been identified and designed; and partly on a historical record that tells us that mandatory deficiencies, frequently of a major kind, are normal in development aircraft emerging from Phase I NPE. In past development these have been corrected, with the result that we fly highly satisfactory aircraft in the Fleet.

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ABOUT PEOPLE

DEPARTMENT OF DEFENSE

The Advanced Research Projects Agency has announced the appointment of **Dr. Alan S. Tetelman** as Dep. Dir. of its Materials Sciences Office. He succeeds **Dr. Alan D. Franklin** who has returned to the National Bureau of Standards.

Col. Rodger R. Bankson, USA, has assumed the post of Dir. for Defense Information, Office of the Secretary of Defense (Public Affairs).

Col. Paul P. Dailey USA, has been named Dir., Terminals and Installations, at Military Traffic Management and Terminal Service headquarters, Bailey's Crossroads, Va.

DEPARTMENT OF THE ARMY

Maj. Gen. Robert E. Coffin has succeeded **Maj. Gen. William C. Gribble** as Dep. Chief of Research and Development, Headquarters, U.S. Army.

Brig. Gen. H. G. Davisson, Commander, White Sands Missile Range, N.M., was promoted to the rank of major general effective Oct. 2.

Brig. Gen Roland M. Gleszer, Dir. of Management, Office of the Comptroller of the Army, was promoted to the rank of major general Nov. 1.

The following reassignments have been made in the Office of the Chief of Research and Development: **Col. Frank A. Bates Jr.** succeeds **Brig. Gen. George Sammet** as Executive; **Col. Thomas N. Chavis** fills the post of Dep. Dir., Missiles and Space, vacated by Col. Bates; and **Col. William J. Lynch** takes over Col. Chavis' former assignment as Asst. Dir., Army Research.

Other changes in the Office of the Chief of Research and Development include: **Col. Earl K. Buchan,** Chief, Air Mobility Div.; **Col. Joe B. Lamp,** Chief, Combat Materiel Div.; **Col. George R. O'Neal,** Chief, Communications-Electronics Div.; and **Lt. Col. David H. Thomas,** Chief, Resources and Requirements Div., Nike-X Systems Office.

Col. Clifton O. Duty has been reassigned to the Army Aviation Materiel Command, St. Louis, Mo., for duty as Dir., Procurement & Production.

Col Edwin T. O'Donnell has been named Commanding Officer, Research and Development Center, Army Mobility Equipment Command, Fort Belvoir, Va.

Col. Morris W. Pettit has been assigned as Project Manager, Nike Hercules Missile System, Army Missile Command, Huntsville, Ala.

DEPARTMENT OF THE NAVY

VAdm. John J. Hyland, Commander of the U.S. Seventh Fleet, has been named to the post of Commander in Chief, U.S. Pacific Fleet. Succeeding Adm. Hyland as Seventh Fleet Commander will be **RAdm. William F. Bringle,** who has been Dep. Chief of Staff, (Plans and Operations) under the Commander in Chief, U.S. Pacific Fleet.

RAdm. Eli T. Reich has been reassigned from duty as Asst. Dep. Chief of Naval Operations (Logistics) to the post of Dep. Comptroller of the Navy.

RAdm. Herman J. Trum III has relieved **RAdm. William E. Ferrall** as Commandant, Thirteenth Naval District, with headquarters in Seattle, Wash.

RAdm. Turner F. Caldwell has been assigned duty as Exec. Dir., Anti-Submarine Warfare Programs, in the Office of the Chief of Naval Operations.

Capt. Johns H. Behl has become Commanding Officer, Naval Weapons Services Office, Naval Air Engineering Center, Philadelphia, Pa.

Capt. Cecil C. Allen, SC, has been assigned as Officer-in-Charge, Atlantic Fleet Polaris Material Office, Charleston, S.C.

Capt. Alvin F. Emig has assumed command of the newly established Ground Support Equipment Department, Naval Air Engineering Center, Philadelphia, Pa.

Capt. Robert L. Wessel will relieve **Capt. E. B. Jarman** as Commanding Officer, Corona Laboratories, Naval Weapons Center, China Lake, Calif., in December.

DEPARTMENT OF THE AIR FORCE

Maj. Gen. Kenneth E. Pletcher has been designated the Surgeon General of the Air Force with promotion to the rank of lieutenant general. He replaces **Lt. Gen. Richard L. Bohannon** who is retiring effective Dec. 1.

Maj. Gen. Paul T. Cooper has been assigned duty as Vice Commander, Space & Missile Systems Organization (SAMSO), Air Force Systems Command. Gen. Cooper previously served as SAMSO Dep. Commander for Space.

Maj. Gen. Robert H. McCutcheon has been named to replace retiring **Maj. Gen. T. Alan Bennett** as Commander, Ogden Air Materiel Area, Air Force Logistics Command.

Brig. Gen. William G. Moore Jr. has been assigned duty as Dir., Operational Requirements & Development Plans, Office of Dep. Chief of Staff (Research and Development), Hq., USAF.

New assignments in the Air Force Systems Command include: **Col. Richard P. Gingland,** Chief, Systems Acquisition, Space & Missile Systems Organization (SAMSO); **Col. William J. Henderson,** Dir., Vela Nuclear Detection Satellite Program, SAMSO; **Col. Norman J. Keefer,** Dir., Agena Program Office, SAMSO; **Col. Stanley M. Lockie,** Chief, Research & Technology, SAMSO; **Col. John A. Murphy,** Dir., Procurement & Production, Manned Orbiting Laboratory, SAMSO; **Col. Richard O. Ransbottom,** Dir., RC-135 System Program Office, Aeronautical Systems Div.; **Col. F. E. Rundell,** Dep. Commander, Air Force Armament Laboratory, Air Proving Ground Center, Eglin AFB, Fla.

New assignments in the Air Force Logistics Command include: **Col. E. H. Gordon,** Chief, F-4 Systems Support Management Div., Materiel Management Directorate, Ogden Air Materiel Area; **Col. George M. Lunsford,** Chief, Force Structure and War Plans Div., AFLC Hq.; **Lt. Col. Cecil G. Furbish,** Director of Information, AFLC.

HEADQUATERS, U
OFFICE OF THE DIRECTOR,

DI
BGEN Frank E. Gar

DEPUTY
COL Thomas M. Fle

SPECIAL ASSISTANT FOR
COMBAT ART
COL Raymond Henri 3204 41071

MARINE CORPS INFORMATION OFFICE
LOS ANGELES
LTCOL David M. Ridderhof
6087 Sunset Boulevard
Los Angeles, California 90028
(213) 688-2520

ASSISTANT DIRECTOR FOR
PUBLIC AFFAIRS
COL Paul M. Moriarty 3204 41071

PUBLIC AFFAIRS BRANCH
LTCOL Verle E. Ludwig 3210 41492
PRESS SECTION
1stLT Michael G. Pitts 3210 41492
RADIO-TV SECTION
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COMMUNITY RELATIONS SECTION
MAJ Robert G. Preblhalo 3210 41054
SERVICES BRANCH
MAJ Gareth W. Smeltzer 3206 41034
CORRESPONDENCE OFFICER
CAPT Ronald L. Smith 3206 41495
ADMINISTRATIVE OFFICER
1stLT Richard S. Sanborn 3206 41495
BIOGRAPHER
MRS. Nellie E. Herring 3206 41495

S. MARINE CORPS
IVISION OF INFORMATION

OR
on 3202 42958

RECTOR
3202 41071

SPECIAL ASSISTANT FOR
PLANS AND POLICY
LTCOL George R. Scharnberg 3204 41495

MARINE CORPS INFORMATION OFFICE
NEW YORK
LTCOL Richard S. Stark
663 Fifth Avenue
New York, New York 10022
(212) PL-57846

ASSISTANT DIRECTOR FOR
SUPPORT ACTIVITIES
COL Henry Hart 201B HH 3 42857

SUPPORT BRANCH
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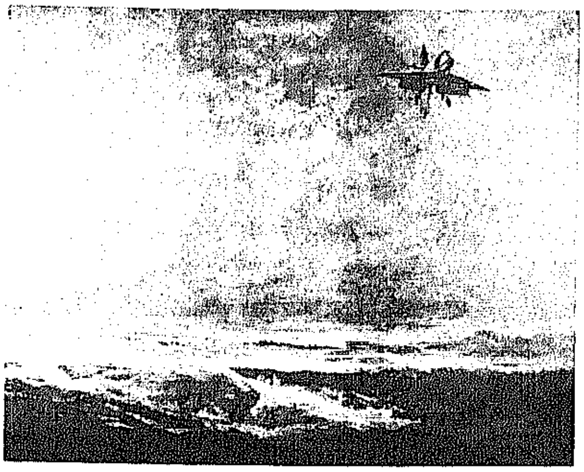
SPEECH SECTION
CAPT James W. Jones 201B HH 3 42857

AUDIO-VISUAL PRODUCTION BRANCH
LTCOL Richard L. McDaniel HH 23 42355

AUDIO PRODUCTION SECTION
1stLT William H. Stuckey 106 HH 4 42354

VISUAL PRODUCTION SECTION
MAJ Gregory S. Prichard HH 23 43723

Division of Information is located in the
Arlington Annex (Columbia Pike and Arlington
Ridge Road, Virginia), Washington, D. C. 20380.
Telephone: Area Code 202, OXford plus number listed.



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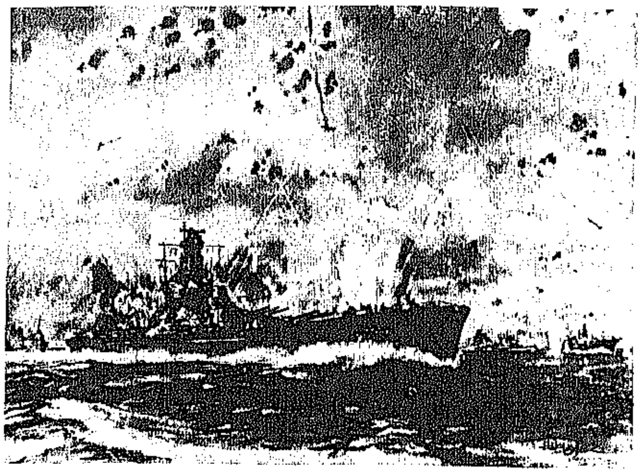

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2

1. "Hook Down, Wheels Down" by James Scott.

2. "Beach Red" by John Groth.

3. "UDT Men" by Robert J. Benson.

4. "Air Defense" by Dwight C. Shepler.

Navy Makes Combat Art Available to Industry

The U.S. Navy's collection of more than 3,000 original paintings, sketches and drawings, created in a wide variety of media and techniques, is available for reproduction as calendar sheets, magazine and poster advertisements, book jackets, desk mementos, and other advertising uses.

The combat art collection's historical paintings range in subject area from World War I and II battle scenes to modern combat illustrations and impressionistic renderings of industrial and nautical facilities, people and places throughout the world. Some color separations are already available.

The collection is the property of the U.S. Navy and no releases from artists or payment of fees for reproduction rights are required. To obtain reproductions or further information on use of original art, write or call:

Office of the Chief of Information
Attention: OI-300
Department of the Navy
Room 2E 335, The Pentagon
Washington, D.C. 20350
Telephone: (202) OXford 7-7221

SELECTED DEFENSE DEPARTMENT ECONOMIC INDICATORS

(DOLLARS IN MILLIONS; MANPOWER IN THOUSANDS; QUARTERS BY CALENDAR YEAR)

	1966 I	II	III	IV	1967 I	Apr	May	Jun	II	Jul	Aug	Sept	III
I. *Military Prime Contract Awards*													
Aircraft	$ 1,945	$ 2,989	$ 2,696	$ 2,262	$ 2,102	$ 432	$ 1,240	$ 1,377	$ 3,049	$ 394	$ 636	$1,483	$ 2,513
Missile & Space Systems	1,040	987	1,314	861	1,230	300	260	606	1,166	535	521	524	1,580
Ships	355	491	876	239	679	72	129	206	407	178	104	135	417
Weapons & Ammunition	555	1,486	692	940	818	279	518	972	1,769	92	415	597	1,104
Electr. & Communications Eqpt.	918	1,574	666	915	971	480	338	1,030	1,848	169	364	283	816
Other Hard Goods	843	1,842	660	1,029	915	298	362	904	1,564	202	355	228	785
Soft Goods	709	922	1,078	989	638	171	199	282	652	588	280	188	1,056
Construction	207	392	198	150	232	126	160	340	626	56	100	76	232
All Other	1,406	1,963	2,356	1,639	1,605	517	507	963	1,987	1,194	568	573	2,335
Total (Excl. of work outside U.S.)	7,978	12,646	10,536	9,024	9,190	2,675	3,713	6,680	13,068	3,408	3,343	4,087	10,838
Total, Seasonally Adjusted	8,703	10,144	10,716	10,149	10,171	2,920	4,121	3,626	10,667	3,610	3,686	3,665	10,961
Work Outside U. S.	521	1,195	856	672	453	227	228	379	834	314	382	195	891
II. *Gross Obligations Incurred*													
Operations	8,326	9,604	10,426	9,702	10,229	3,664	3,531	4,239	11,435	3,700			
Procurement	4,374	8,539	5,368	5,276	5,113	1,801	2,485	4,663	8,948	1,045			
Other	2,429	3,470	3,453	2,230	2,519	726	1,130	1,653	3,510	1,246			
Total	15,129	21,613	19,247	17,208	17,861	6,191	7,146	10,555	23,893	5,991			
III. *Gross Unpaid Obligations Outstanding*													
Operations	3,828	3,777	4,792	5,024	4,644	4,761	4,765	4,513	4,513				
Procurement	18,023	22,119	22,736	23,173	22,780	22,613	22,947	25,248	25,248				
Other	5,747	7,392	8,179	7,888	7,626	7,453	7,628	8,270	8,270				
Total	27,598	33,288	35,707	36,085	35,050	34,827	35,340	38,031	38,031				
IV. *Net Expenditures*													
Operations	7,689	9,076	8,968	9,087	10,002	3,416	3,335	3,980	10,731	2,898	3,722	3,382	10,002
Procurement	3,651	3,886	4,392	4,264	5,074	1,783	1,850	1,649	5,282	2,037	1,982	2,041	6,060
Other	2,757	2,647	2,484	3,092	3,179	918	749	334	2,001	1,231	882	930	3,044
Total	14,097	15,609	15,844	16,443	18,255	6,117	5,934	5,963	18,014	6,166	6,586	6,353	19,106
V. *DOD Personal Compensation*													
Military	3,181	3,249	3,551	3,606	3,624	1,230	1,196	1,220	3,646	1,310	1,260		
Civilian	1,937	2,015	2,105	2,135	2,163	700	776	772	2,248	729	786(p)	723(p)	2,238(p)
Total	5,118	5,264	5,656	5,741	5,787	1,930	1,972	1,992	5,894	2,039	2,046(p)		
VI. *Outstanding Payments*													
Advance Payments	66	79	90	83	92				80				
Progress Payments	4,402	4,346	4,750	5,461	5,981				6,765				
Total	4,468	4,425	4,840	5,544	6,073				6,845				
VII. *Strength (Manpower)*													
Military	2,969	3,094	3,229	3,334	3,371	3,371	3,368	3,377	3,377	3,382	3,393	3,407(p)	3,407(p)
Civilian	1,088	1,138	1,184	1,230	1,268	1,273	1,274	1,303	1,303	1,311	1,306	1,274(p)	1,274(p)

p—preliminary

NOTE: Open spaces for Indicators othen than No. VI indicate information not available at time of publication. Indicator No. VI information available only on a quarterly basis.

Directorate for Statistical Services
OASD (Comptroller)
October 26, 1967

ARISTOTLE Symposium in Washington Dec. 6–7

The first ARISTOTLE Symposium, sponsored by the National Security Industrial Association, will be held on Dec. 6–7, 1967, at the Washington Hilton Hotel, Washington, D.C.

Project ARISTOTLE (acronym for Annual Review and Information Symposium on the Technology of Training, Learning and Education) was established as a result of a conference held in June 1966, co-sponsored by the National Security Industrial Association, the Defense Department, the Labor Department and the Office of Education, to provide a structure to encourage continuing communication and exchange of accomplishments within the government/industry/education communities.

The symposium will consist of two general sessions featuring presentations by key officials in education, industry and government. The topics of these sessions will be:

• Government, Industry and Education as Working Partners.

• What Education Wants from Government and Industry.

ARISTOTLE is structured into ten task groups consisting of voluntary part-time members. Panel sessions and workshops will present and discuss the many findings and developments of the task groups' efforts during the past year.

For registration and additional information, the contact is:

P. A. Newman
National Security Industrial
Association
1030 15th St. NW
Washington, D.C. 20005
Phone: (202) 296-2266

U.S.-Japan Sign Agreement for Missile Systems

Japanese and U.S. officials have signed agreements in Tokyo for the production and procurement of military equipment for Japan's Self-Defense Forces.

The equipment includes three battalions of Hawk and associated missiles and supporting equipment to be produced in Japan.

Also included in the agreement is the procurement from U.S. sources of two battalions of Nike Hercules ground support and auxiliary equipment; production in Japan of Nike Hercules missiles; and procurement from the United States of another battalion of Nike Hercules equipment to be programmed in the Japanese FY 1972.

The Nike and Hawk programs play an important role in the Japanese Third Defense Buildup Plan covering the period Japanese FY 1967–1971.

Military Oceanography Symposium To Be Held in Florida

The Fifth Annual Symposium on Military Oceanography, sponsored by the Oceanographer of the Navy, will be held in Panama City, Fla., May 1–3, 1968.

Purpose of the symposium will be to provide an opportunity for scientists, engineers and military personnel to present papers, exchange information, and discuss problems concerning military oceanography. The sessions will be classified to facilitate free and open discussion.

Call for papers and applications for invitations will be issued early in January.

For information concerning the symposium contact:

Oceanographer of the Navy
732 N. Washington St.
Alexandria, Va. 22314

Navy/Marine Corps Research and Development Problems

The 1967 edition of the publication, "Navy/Marine Corps Research and Development Problems," is now available for distribution, without charge, to interested industrial firms educational institutions, libraries and individuals. It contains a compilation of problems for which the Naval Material Command and the Marine Corps are seeking solutions. The problems described fall into eight categories:

- Chemical Sciences.
- Electrical Sciences.
- Electronic sciences.
- Engineering Mechanics.
- Life Sciences.
- Material Sciences.
- Physical Sciences.
- Simulation and Training Technology.

The prime objective of the publication is to enlist the assistance, experience and ingenuity of industrial organizations and educational institutions toward obtaining fresh approaches, ideas and techniques.

Anyone interested in obtaining the publication should complete the form below, clip and mail to:

Chief of Naval Material
Attention: MAT 0541
Department of the Navy
Washington, D.C. 20360

Please send ______ copies of "Navy/Marine Corps Research and Development Problems" to:

Name ____________________

____

Street or P.O. Box ____________________

City and State ____________________

Zip Code ____________

Army Redesignates Chief of C-E

The Army's Chief of Communications-Electronics (CC–E) has been redesignated the Assistant Chief of Staff for Communications-Electronics (ACSC–E), and will now report directly to the Army Chief of Staff.

With the redesignation, Army communication functions assume staff parity with personnel, operations, intelligence and logistics in the Army staff structure. The CC–E, as head of a special staff agency, formerly operated under the Deputy Chief of Staff for Military Operations.

Major General Walter E. Lotz Jr., present CC–E, will be retained as ACSC–E.

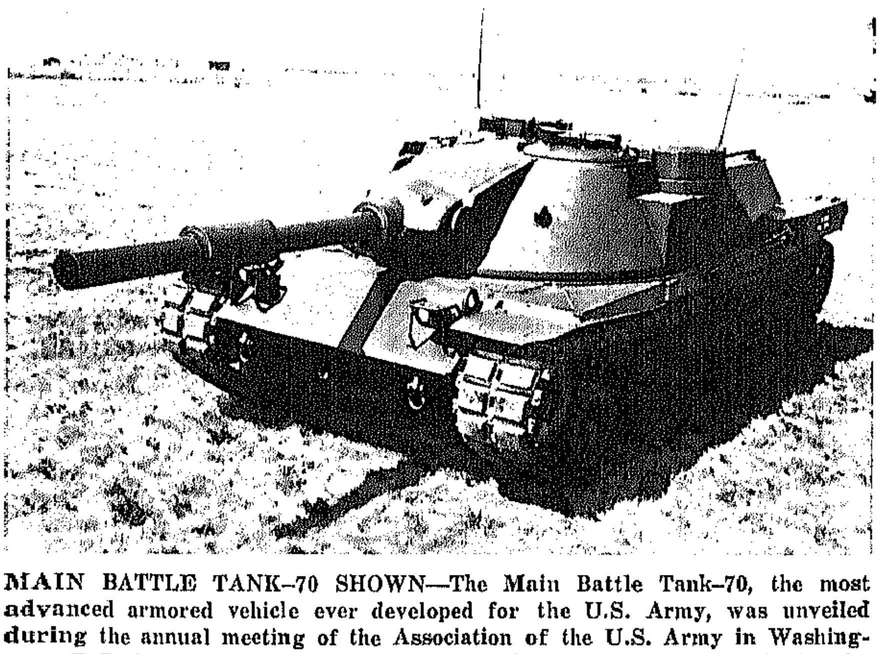
The redesignation results from an Army study which recommended elevation of the communications staff function to a higher level. The change is expected to improve the agency's capability to coordinate and manage the expanding communications function within the Army, as well as with other agencies and commands.

Notice Transit Symposium Delayed

The Navy Navigation Satellite System (Transit) Symposium scheduled to be held in Washington, D. C., on Nov. 30, announced on the inside back cover page of the November issue of the *Bulletin*, has been dlayed until early spring according to John H. Jorgenson of the National Security Industrial Association.

The technical information and documentation on the system's shipboard user equipment will be available beginning Nov. 30. A charge, estimated at $30 to $35, will be made to cover the cost of reproduction and mailing. Sales to foreign purchasers are subject to normal munitions control procedures and export control regulations. To obtain the material, contact:

National Security Industrial Association
Department T
1030 15th St. NW
Washington, D. C. 20005
Phone: (202) 296–2266



MAIN BATTLE TANK–70 SHOWN—The Main Battle Tank–70, the most advanced armored vehicle ever developed for the U.S. Army, was unveiled during the annual meeting of the Association of the U.S. Army in Washington, D.C., in October. The radically new tank was developed jointly by the United States and the Federal Republic of Germany. Among the features of the MBT–70 are more accurate fire control, more powerful engine and improved armor protection.

INFORMATION PROCESSING SYSTEM

(*Continued from Page 7*)

truly competitive throughout the range of requirements. However, the system's requirements are tightly drawn and the benchmark test developed to measure these requirements. Because of this, the Air Force does not speculate with regard to potential performance of contractractors' systems not submitted in accordance with the rules governing the RFP.

The Air Force is continually working to improve the selection process. As the number of users of ADP equipment increases, the need for continuing refinement of user requirements becomes essential. In order to obtain the best computer system, the Air Force at the present time reflects the user requirements in the desirable features and the mandatory requirements of the RFP. One possible refinement to the present process would be to require that the user estimate variable future workloads and the probability of each of these workloads. This information could then be submitted to the vendors in the RFP. Responses could be designed for each workload level and evaluated by the expected cost concept.

The acquisition of management data processing systems by the Air Force is an integral part of overall DOD planning, programming and budgeting. The final objective is a family of management information systems, each accomplishing a particular mission, and each interfaced into a total structure to support world-wide Air Force management.

NSC Puget Sound Established

The Naval Supply Depot, Seattle, Wash., has been disestablished and its functions transferred to the newly established Puget Sound Naval Supply Center, headquartered in Bremerton.

Captain Stuart M. Ball, SC, former Commanding Officer, NSD, Seattle, will command the new organization, which will consist of three divisions located in Seattle, Bremerton and Manchester.

STATUS OF FUNDS

DEPARTMENT OF DEFENSE

Military Functions and Military Assistance Program

Quarterly Report

Prepared by:

Directorate for Financial Analysis and Control
Office of the Assistant Secretary of Defense (Comptroller)
Room 3C 839, The Pentagon Phone: (202) OXford 7-2332

NOTE: All expenditure amounts are on a net Treasury basis (gross payments less reimbursement collections), whereas obligations and unpaid obligations are on a gross basis (inclusive of reimbursable activity performed by components of DoD for each other). Therefore, unpaid obligations as of the end of the reporting month cannot be computed from other figures in this report.

Expenditures

Fourth Quarter, Fiscal Year 1967

(Amounts in Thousands)

Department of Defense

	Expenditures				Unpaid Obligation	
	April 1967	May 1967	June 1967	Cum thru June 30, 1967	At start of year	As of June 3 1967
Military Personnel						
Active forces	1,619,696	1,363,606	[illegible]	[illegible]	[illegible]	850,07
Reserve forces	72,564	76,471	[illegible]	[illegible]	[illegible]	149,96
Retired pay	169,208	153,952	[illegible]	[illegible]	6,052	7,62
Undistributed	33,405	16,752	[illegible]			
Total—Military Personnel	1,784,864	1,563,462	[illegible]	[illegible]	[illegible]	1,007,66
Operation and Maintenance	1,631,430	1,762,462	[illegible]	[illegible]	[illegible]	1,505,18
Procurement						
Aircraft	220,346	260,627	[illegible]	[illegible]	[illegible]	[illegible]
Missiles	172,627	162,236	361,814	[illegible]	[illegible]	1,329,01
Ships	139,260	142,697	137,365	[illegible]	[illegible]	1,049,78
Tracked combat vehicles	32,690	49,017	[illegible]	[illegible]	443,029	632,69
Ordnance, vehicles, and related equipment	414,707	495,469	[illegible]	[illegible]	[illegible]	6,721,78
Electronics and communications	119,329	101,365	[illegible]	[illegible]	[illegible]	1,209,17
Other procurement	329,956	160,617	[illegible]	[illegible]	[illegible]	1,047,50
Undistributed	-51,208	-65,660	-149,945	[illegible]	[illegible]	-390,05
Total—Procurement	1,782,782	1,850,060	[illegible]	[illegible]	[illegible]	25,246,1
Research, Development, Test, and Evaluation						
Military sciences	81,057	90,640	[illegible]	[illegible]	[illegible]	867,781
Aircraft	70,869	70,973	[illegible]	[illegible]	[illegible]	730,12
Missiles	178,070	228,854	[illegible]	[illegible]	[illegible]	[illegible]
Astronautics	73,388	101,422	[illegible]	[illegible]	[illegible]	649,72
Ships	30,798	19,143	[illegible]	[illegible]	[illegible]	212,77
Ordnance, vehicles, and related equipment	32,860	20,917	[illegible]	[illegible]	[illegible]	235,442
Other equipment	60,050	64,044	[illegible]	[illegible]	[illegible]	544,357
Program-wide management and support	35,625	27,010	36,683	[illegible]	[illegible]	163,038
Undistributed	7,962	18,546	[illegible]	[illegible]	[illegible]	-194,032
Total—Research, Development, Test, & Evaluation	649,504	644,654	[illegible]	[illegible]	[illegible]	4,169,185
Military Construction	97,220	[illegible]	[illegible]	[illegible]	[illegible]	1,581,256
Family Housing	43,605	45,935	[illegible]	[illegible]	[illegible]	114,984
Civil Defense	7,108	6,062	12,204	[illegible]	[illegible]	91,893
Other—Special Foreign Currency Program		*	11	11		2,193
Revolving and Management Funds*	161,213	-118,458	[illegible]	[illegible]	[illegible]	[illegible]
Subtotal—Military Functions	6,056,846	5,941,473	[illegible]	[illegible]	[illegible]	[illegible]
Military Assistance	60,136	92,983	[illegible]	[illegible]	[illegible]	2,112,357
TOTAL—DEPARTMENT OF DEFENSE	6,116,982	5,934,456	[illegible]	[illegible]	[illegible]	[illegible]

* Includes In-Transit Stock Fund charges not reflected in Service amounts.
NOTE: Detail may not add to rounded totals.

Department of the Army

	Expenditures				Unpaid Obligations	
	April 1967	May 1967	June 1967	Cum thru June 30, 1967	At start of year	As of June 30, 1967
Military Personnel						
Active forces	583,285	573,461	779,371	6,696,371	320,524	392,872
Reserve forces	44,377	55,195	74,868	603,835	114,434	112,152
Undistributed	37,810	-8,077	-33,105	—	—	—
Total—Military Personnel	665,472	620,579	821,134	7,300,206	434,958	505,024
Operation and Maintenance	664,477	724,749	929,014	7,293,385	881,122	1,252,029
Procurement						
Aircraft	108,639	76,045	99,741	961,576	1,137,653	1,303,735
Missiles	37,098	23,903	-14,373	220,627	537,097	458,264
Tracked combat vehicles	31,914	47,721	34,062	264,826	432,565	611,133
Ordnance, vehicles, and related equipment	216,810	181,685	-101,077	1,780,281	3,421,137	3,387,912
Electronics and communications	58,200	41,702	77,682	476,830	738,404	780,554
Other procurement	75,358	58,361	103,606	637,390	666,038	817,300
Undistributed	-58,114	-55,373	-135,310	48,425	-337,631	-386,056
Total—Procurement	469,903	374,043	64,332	4,389,965	6,595,263	6,972,842
Research, Development, Test, and Evaluation						
Military sciences	15,876	11,215	23,699	165,565	120,589	133,665
Aircraft	10,565	9,860	8,274	120,456	92,925	85,463
Missiles	61,357	48,266	97,776	752,325	461,337	435,876
Astronautics	2,473	1,265	1,437	22,008	20,741	15,069
Ordnance, vehicles, and related equipment	19,793	12,686	12,450	179,734	139,922	136,432
Other equipment	26,316	25,065	29,802	267,311	197,438	218,437
Program-wide management and support	3,235	5,231	7,412	78,362	31,310	39,835
Undistributed	-10,443	14,219	-62,240	48,189	-145,833	-194,032
Total—Research, Development, Test, & Evaluation	129,171	127,808	118,619	1,633,950	918,429	870,745
Military Construction	178,599	26,141	18,057	447,850	518,995	818,076
Revolving and Management Funds	5,529	-74,091	204,610	-55,082	40,077	58,732
TOTAL—DEPARTMENT OF THE ARMY	2,113,153	1,799,229	2,155,766	21,010,265	9,388,844	10,477,449

Department of the Navy

	Expenditures				Unpaid Obligations	
	April 1967	May 1967	June 1967	Cum thru June 30, 1967	At start of year	As of June 30, 1967
Military Personnel						
Active forces	492,376	382,352	512,083	5,082,840	141,289	232,405
Reserve forces	12,428	12,562	14,098	149,515	20,898	19,698
Undistributed	-4,573	-6,980	1,593	—	—	—
Total—Military Personnel	500,231	387,934	527,774	5,232,355	162,187	252,103
Operation and Maintenance	449,558	442,056	428,294	5,058,303	1,230,060	1,197,396
Procurement						
Aircraft	209,975	218,979	234,270	2,606,578	2,818,833	3,542,971
Missiles	22,911	55,587	35,166	431,702	560,035	470,557
Ships	139,200	142,697	147,165	1,398,402	2,867,571	3,049,781
Tracked combat vehicles	985	1,296	474	8,768	16,445	21,547
Ordnance, vehicles, and related equipment	105,432	117,002	224,924	1,099,990	1,418,223	1,611,746
Electronics and communications	27,824	41,978	50,527	413,784	589,237	656,377
Other procurement	54,082	45,523	59,460	525,611	726,357	921,116
Undistributed	-3,609	-5,252	-8,568	—	—	—
Total—Procurement	556,799	617,809	743,420	6,484,835	8,996,701	10,274,095
Research, Development, Test, and Evaluation						
Military sciences	11,586	12,600	11,520	184,366	137,459	127,323
Aircraft	14,488	26,705	20,086	242,041	159,020	260,838
Missiles	47,400	91,995	56,222	710,900	249,864	293,783
Astronautics	2,365	2,111	1,708	23,020	15,876	12,677
Ships	20,796	19,142	18,999	296,285	204,792	212,773
Ordnance, vehicles, and related equipment	13,067	14,131	14,070	163,372	97,150	99,010
Other equipment	7,753	7,089	7,158	80,918	61,511	89,328
Program-wide management and support	3,497	4,371	11,190	90,199	88,594	97,989
Undistributed	3,385	1,101	-4,256	—	—	—
Total—Research, Development, Test, & Evaluation	124,336	179,245	136,697	1,791,101	1,014,266	1,193,721
Military Construction	-227,382	38,736	14,082	522,638	323,771	269,300
Revolving and Management Funds	106,395	-20,178	24,384	202,264	617,445	462,849
TOTAL—DEPARTMENT OF THE NAVY	1,509,937	1,645,603	1,874,651	19,291,496	12,344,431	13,649,465

Department of the Air Force

	Expenditures				Unpaid Obligations	
	April 1967	May 1967	June 1967	Cum thru June 30, 1967	At start of year	As of June 30 1967
Military Personnel						
Active forces	444,034	407,993	464,799	5,274,973	127,796	224,799
Reserve forces	15,749	8,714	13,608	148,953	21,465	18,013
Undistributed	171	-1,695	424	—	—	—
Total—Military Personnel	459,954	415,012	478,831	5,423,926	149,261	242,812
Operation and Maintenance	444,653	501,437	551,792	5,714,461	805,314	955,856
Procurement						
Aircraft	407,732	471,503	322,911	4,842,449	3,552,182	4,508,567
Missiles	112,618	102,746	142,321	1,278,051	985,895	1,000,194
Ordnance, vehicles & related equipment	92,447	186,558	304,266	1,095,400	1,269,060	1,719,842
Electronics and communications	32,645	25,364	30,174	384,696	519,055	555,915
Other procurement	96,628	75,068	41,159	495,765	153,725	164,740
Undistributed	10,841	-5,583	-5,027	—	—	—
Total—Procurement	752,910	855,657	835,804	8,096,361	6,479,917	7,949,258
Research, Development, Test, and Evaluation						
Military sciences	13,625	15,635	11,269	154,310	131,634	131,619
Aircraft	45,805	42,408	39,632	668,938	287,333	449,824
Missiles	69,313	88,593	77,879	913,803	386,017	366,248
Astronautics	68,550	87,046	104,093	934,677	562,929	622,047
Other equipment	23,981	31,890	24,224	309,783	221,215	233,992
Program-wide management and support	18,793	17,414	18,081	247,681	34,752	25,214
Undistributed	15,050	3,226	-19,091	—	—	—
Total—Research, Development, Test, & Evaluation	255,117	286,210	256,089	3,229,192	1,623,880	1,828,944
Military Construction	145,263	9,635	69,095	550,289	442,931	473,206
Revolving and Management Funds	-183	-21,279	-49,922	-69,002	686	6,252
TOTAL—DEPARTMENT OF THE AIR FORCE	2,057,714	2,046,673	2,141,687	22,945,226	9,501,989	11,456,328

Defense Agencies/Office of the Secretary of Defense

	Expenditures				Unpaid Obligations	
	April 1967	May 1967	June 1967	Cum thru June 30, 1967	At start of year	As of June 30 1967
Military Personnel						
Retired Pay	159,208	158,957	161,539	1,830,233	8,052	7,62
Operation and Maintenance	72,750	84,224	81,609	934,103	106,140	99,90
Procurement						
Ordnance, vehicles, and related equipment	18	215	180	1,939	1,796	2,23
Electronics and communications	560	324	97	8,955	8,438	5,33
Other procurement	2,918	1,665	4,997	29,812	36,649	44,34
Undistributed	-326	348	-40	—	—	—
Total—Procurement	3,169	2,553	5,234	40,706	46,883	51,90
Research, Development, Test, and Evaluation						
Military sciences	39,970	51,390	41,845	505,424	501,805	474,77
Military Construction	740	878	2,023	14,802	24,025	20,67
Family Housing	43,605	45,835	49,173	558,235	130,266	114,96
Other—Special Foreign Currency Program	—	*	11	11	—	2,19
Revolving and Management Funds	105,717	13,671	-55,044	433,844	—	—
TOTAL—DEFENSE AGENCIES/OSD	425,159	357,509	286,389	4,317,358	817,172	772,03

Office of Civil Defense

Civil Defense	7,108	6,062	12,204	100,058	77,877	91,89
Revolving and Management Funds	—	—	*	-1	—	—
TOTAL—OFFICE OF CIVIL DEFENSE	7,108	6,062	12,203	100,056	77,877	91,89

Military Assistance

Military Personnel	12	86	101	448	72	525
Operation and Maintenance	38,691	39,858	52,608	331,911	364,523	289,568
Procurement						
Aircraft	14,952	20,137	42,121	204,158	339,429	235,101
Missiles	-2,784	3,828	7,270	29,800	67,918	23,650
Ships	1,244	906	34,396	51,150	114,172	114,450
Ordnance, vehicles and related equipment	523	12,264	53,107	131,896	242,867	264,633
Electronics and communications	1,789	5,456	19,457	60,770	181,174	132,402
Other procurement	2,724	3,083	18,786	57,612	138,193	127,226
Total—Procurement	18,447	45,673	175,138	535,386	1,089,753	897,462
Research, Development, Test, and Evaluation	—	13,241	12,255	25,671	3,084	401
Military Construction	-14	-6,001	-11,024	19,912	151,977	171,824
Revolving Fund	1,676	-28,830	-9,562	-30,373	158,605	764,607
Undistributed	1,329	28,950	-10,227	-10,310	48,148	12,030
TOTAL—MILITARY ASSISTANCE	60,136	92,983	209,287	872,644	a/1,816,161	2,112,357

a Consistent with the decision to treat reservations under limitation .002 as obligations in reports commencing with FY 1967, the unpaid obligations at start of year are comprised of obligations/reservations and, thus, differ from the unpaid obligations as of June 30, 1966, as shown in the report of June 30, 1966.

Obligations

Fourth Quarter, Fiscal Year 1967

(Amounts in Thousands)

Department of Defense

	Available for obligation	Obligations April 1967	May 1967	June 1967	Cum thru June 30, 1967	Unobligated Balance June 30, 1967
Military Personnel						
Active forces	17,686,262	1,507,789	1,486,697	1,511,994	17,577,951	108,311
Reserve forces	952,869	76,414	81,752	121,409	919,934	32,935
Retired pay	1,839,000	158,430	160,226	161,622	1,831,159	7,841
Total—Military Personnel	20,478,131	1,742,631	1,728,677	1,795,026	20,329,046	149,085
Operation and Maintenance	21,596,320	1,921,342	1,802,385	2,444,454	21,462,890	133,430
Procurement						
Aircraft	14,493,069	659,134	1,041,298	2,101,967	10,808,146	3,684,923
Missiles	2,647,946	188,217	174,400	314,443	2,060,931	587,015
Ships	5,026,364	106,446	66,647	178,901	1,714,458	3,311,906
Tracked combat vehicles	625,950	57,411	29,724	131,609	523,287	102,663
Ordnance, vehicles and related equipment	7,621,325	425,198	745,319	1,148,145	5,907,924	1,713,401
Electronics and communications	2,445,285	138,893	178,802	404,978	1,575,059	870,226
Other procurement	2,961,969	225,564	248,548	382,544	2,115,337	846,632
Undistributed	58,926	—	—	—	—	58,926
Total—Procurement	35,880,834	1,800,863	2,484,744	4,662,584	24,705,142	11,175,692
Research, Development, Test, & Evaluation						
Military sciences	1,238,879	71,464	78,829	184,301	1,050,573	188,306
Aircraft	1,520,199	60,080	105,811	204,732	1,301,974	218,225
Missiles	2,573,357	74,953	92,702	192,771	2,471,218	102,139
Astronautics	1,388,992	97,296	236,742	180,511	1,278,097	110,895
Ships	399,893	32,099	15,710	42,526	330,362	69,531
Ordnance, vehicles, and related equipment	422,035	14,985	14,928	41,558	369,263	52,772
Other equipment	940,989	57,449	67,591	127,024	763,516	177,473
Program-wide management and support	674,691	39,030	47,694	70,067	602,358	72,338
Emergency Fund	3	—	—	—	—	3
Undistributed	11,209	—	—	—	—	11,209
Total—Research, Development, Test, & Evaluation	9,170,245	447,353	660,009	1,043,486	8,167,361	1,002,884
Military Construction	3,424,799	199,253	380,313	417,269	2,143,787	1,281,012
Family Housing	729,000	49,868	40,661	61,592	550,105	178,895
Civil Defense	141,456	6,770	9,283	20,835	118,497	22,959
Other—Special Foreign Currency Program	7,348	9	—	2,195	2,204	5,144
Subtotal—Military Functions	91,428,132	6,168,089	7,106,070	10,447,442	77,479,032	13,949,100
Military Assistance	741,104	22,829	40,200	107,998	729,173	11,931
TOTAL—DEPARTMENT OF DEFENSE	92,169,236	6,190,919	7,146,270	10,555,435	78,208,205	13,961,032

Department of the Army

	Available for obligation	Obligations April 1967	May 1967	June 1967	Cum thru June 30, 1967	Unobligated Balance June 30, 1967
Military Personnel						
Active forces	7,007,335	611,038	628,258	616,708	6,919,478	87,857
Reserve forces	646,899	50,493	59,818	90,532	621,398	25,501
Total—Military Personnel	7,654,234	661,529	688,077	707,240	7,540,876	113,358
Operations and Maintenance	8,405,155	781,327	831,350	979,178	8,373,484	31,672
Procurement						
Aircraft	1,433,300	27,920	100,057	370,169	1,142,129	291,171
Missiles	514,488	17,249	15,602	87,205	331,156	183,332
Tracked combat vehicles	602,260	57,747	27,920	132,379	509,417	92,843
Ordnance, vehicles and related equipment	3,871,794	299,548	288,389	790,576	3,033,911	837,883
Electronics and communications	867,830	70,523	99,131	152,772	580,577	287,253
Other procurement	1,145,889	61,230	123,014	127,186	768,018	377,871
Undistributed	26,236	—	—	—	—	—
Total—Procurement	8,461,796	534,218	654,113	1,660,287	6,365,208	2,096,588
Research, Development, Test, & Evaluation						
Military sciences	231,737	10,193	14,020	31,291	204,319	27,418
Aircraft	141,205	4,674	7,799	14,395	113,710	27,495
Missiles	789,374	14,260	28,777	56,074	747,140	42,234
Astronautics	21,002	2,558	3,454	1,410	16,710	4,292
Ordnance, vehicles and related equipment	232,009	6,400	6,994	18,700	204,030	27,979
Other equipment	408,922	30,049	32,012	56,250	312,422	96,500
Program-wide management and support	102,007	3,714	6,467	7,615	93,674	8,333
Undistributed	1,074	—	—	—	—	1,074
Total—Research, Development, Test, & Evaluation	1,927,330	71,848	99,523	185,735	1,692,005	235,325
Military Construction	1,579,368	70,031	175,135	162,051	975,294	604,074
TOTAL—DEPARTMENT OF THE ARMY	28,027,883	2,118,953	2,448,198	3,694,490	24,946,866	3,081,017

Department of the Navy

	Available for obligation	Obligations April 1967	Obligations May 1967	Obligations June 1967	Obligations Cum thru June 30, 1967	Unobligated Balance June 30, 1967
Military Personnel						
Active forces	5,232,396	433,884	435,550	476,850	5,221,137	11,259
Reserve forces	150,852	12,662	12,304	16,116	150,010	842
Total Military Personnel	5,383,248	446,546	447,854	492,967	5,371,148	12,100
Operation and Maintenance	5,803,621	610,072	414,006	780,651	5,755,379	48,242
Procurement						
Aircraft	4,793,925	291,863	338,326	920,454	3,388,539	1,405,386
Missiles	531,999	45,599	-257	83,478	354,425	177,574
Ships	5,026,364	106,446	66,647	178,901	1,714,458	3,311,906
Tracked combat vehicles	23,690	-336	1,804	-770	13,870	9,820
Ordnance, vehicles and related equipment	1,809,356	83,348	224,909	268,014	1,325,433	483,923
Electronics and communications	785,758	37,818	51,632	168,542	490,654	295,104
Other procurement	1,141,571	60,479	65,102	181,178	796,943	344,628
Undistributed	22,392	—	—	—	—	22,392
Total Procurement	14,135,056	625,216	748,169	1,799,794	8,084,322	6,050,734
Research, Development, Test, and Evaluation						
Military sciences	205,862	10,170	14,186	25,326	189,078	16,784
Aircraft	444,914	32,508	61,201	96,537	343,990	100,924
Missiles	790,531	25,293	13,622	64,936	761,151	29,380
Astronautics	26,311	1,160	1,109	5,770	19,745	6,566
Ships	399,893	32,099	15,710	42,526	330,362	69,531
Ordnance, vehicles and related equipment	190,026	8,585	7,934	22,853	165,233	24,793
Other equipment	131,537	10,015	15,912	20,916	113,548	17,989
Program-wide management and support	312,527	19,546	18,855	39,845	251,533	60,994
Undistributed	24	—	—	—	—	24
Total Research, Development, Test, & Evaluation	2,501,625	139,375	148,530	318,709	2,174,640	326,985
Military Construction	959,046	55,526	85,752	142,035	575,068	383,977
TOTAL—DEPARTMENT OF THE NAVY	28,782,596	1,876,736	1,844,310	3,534,157	21,960,558	6,822,039

Department of the Air Force

	Available for obligation	Obligations				Unobligated Balance June 30, 1967
		April 1967	May 1967	June 1967	Cum thru June 30, 1967	
Military Personnel						
Active forces	5,446,531	462,867	422,889	418,436	5,437,336	9,195
Reserve forces	155,118	13,259	9,630	14,761	148,526	6,592
Total—Military Personnel	5,601,649	476,126	432,520	433,197	5,585,863	15,786
Operation and Maintenance	6,370,888	444,962	474,301	595,949	6,339,382	31,507
Procurement						
Aircraft	8,265,844	339,351	602,915	811,344	6,277,478	1,988,366
Missiles	1,601,459	125,369	159,055	143,760	1,375,350	226,109
Ships	—	—	—	—	—	—
Ordnance, vehicles and related equipment	1,936,042	42,025	231,960	89,480	1,546,182	389,860
Electronics and communications	780,100	29,244	27,307	84,972	497,981	282,119
Other Procurement	606,426	99,851	56,418	66,416	506,788	99,638
Undistributed	1,830	—	—	—	—	1,830
Total—Procurement	13,191,701	635,840	1,077,655	1,195,972	10,203,779	2,987,922
Research, Development, Test, & Evaluation						
Military sciences	196,346	12,935	10,561	20,569	176,645	19,701
Aircraft	934,080	22,898	36,811	93,800	844,274	89,806
Missiles	993,452	35,400	50,303	71,761	962,927	30,526
Astronautics	1,341,679	93,578	282,179	173,331	1,241,642	100,037
Other equipment	400,530	17,385	19,667	49,858	337,546	62,984
Program-wide management and support	260,157	15,770	22,372	22,607	257,151	3,006
Undistributed	10,111	—	—	—	—	10,111
Total—Research, Development, Test & Evaluation	4,136,354	197,963	371,894	431,929	3,820,186	316,168
Military Construction	860,771	70,234	115,895	112,330	581,974	278,797
TOTAL—DEPARTMENT OF THE AIR FORCE	30,161,363	1,825,126	2,472,265	2,760,376	26,531,183	3,630,180

Defense Agencies/Office of the Secretary of Defense

	Available for obligation	Obligations April 1967	May 1967	June 1967	Cum thru June 30, 1967	Unobligated Balance June 30, 1967
Military Personnel						
Retired Pay	1,839,000	158,430	160,226	161,622	1,831,159	7,841
Operation and Maintenance	1,016,654	84,081	82,728	88,676	994,645	22,009
Procurement						
Ordnance, vehicles and related equipment	4,133	277	61	75	2,398	1,735
Electronics and communications	11,597	1,308	732	-1,308	5,847	5,750
Other procurement	68,083	4,004	4,014	7,764	43,588	24,495
Undistributed	8,468	...	—	—	—	8,468
Total Procurement	92,281	5,589	4,807	6,531	51,833	40,448
Research, Development, Test, and Evaluation						
Military sciences	604,934	38,166	40,062	107,115	480,531	124,403
Emergency Fund	3	...	...	—	—	—
Undistributed			...	—	—	3
Total Research, Development, Test, & Evaluation	604,937	38,166	40,062	107,115	480,531	124,406
Military Construction	25,613	3,461	3,531	853	11,451	14,163
Family Housing	729,000	49,868	40,661	61,592	550,105	178,895
Other Special Foreign Currency Program	7,348	0	...	2,195	2,204	5,144
TOTAL DEFENSE AGENCIES OSD	4,314,834	340,504	332,015	428,584	3,921,928	392,905

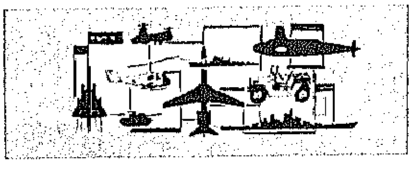
Office of Civil Defense

Civil Defense	141,456	6,770	9,283	20,835	118,497	22,959

Military Assistance

Military Personnel	325	-17	-7	14	325	—
Operation and Maintenance	314,696	28,211	18,837	41,949	302,765	11,931
Procurement						
Aircraft	99,830	-8,209	-3,757	22,676	99,830	—
Missiles	-14,470	-9,217	-1,953	-5,006	-14,470	—
Ships	51,429	3,061	-82	13,212	51,429	—
Ordnance, vehicles and related equipment	147,663	2,474	3,601	17,513	147,663	—
Electronics and communications	11,995	208	4,665	722	11,995	—
Other procurement	46,658	1,090	9,540	8,569	46,658	—
TOTAL PROCUREMENT	343,105	-10,682	12,102	57,688	343,105	—
Research, Development, Test and Evaluation	-1,394	...	...	-73	-1,394	—
Military Construction	84,408	5,318	9,605	8,085	84,408	—
Undistributed	-36	...	-336	329	-36	—
TOTAL MILITARY ASSISTANCE	741,104	22,829	40,200	107,993	729,173	11,931

NOTE: Commencing with reports in FY 1967, reservations under limitation .002 of the Military Assistance Program re being treated as obligations.



DEFENSE PROCUREMENT

Contracts of $1,000,000 and over awarded during the month of October 1967:

DEFENSE SUPPLY AGENCY

2—**Texaco, Inc.**, New York, N.Y. $3,324,240. Fuel oil and gasoline. Defense Fuel Supply Center, Alexandria, Va.

—**Metropolitan Petroleum Co.**, New York, N.Y. $1,482,891. Fuel oil and gasoline. Defense Fuel Supply Center, Alexandria, Va.

3—**Humble Oil & Refining Co.**, Houston, Tex. $2,421,720. 16,800,000 gallons of grade 115/145 aviation gasoline. Defense Fuel Supply Center, Alexandria, Va.

—**Honeywell, Inc.**, Wellesley Hills, Mass. $1,026,597. Rental renewal of 34 line items of automatic data processing equipment now installed at the Defense Construction Supply Center, Columbus, Ohio.

4—**General Aniline & Film Corp.**, New York, N.Y. $2,479,966. 124,744 packages of radiographic film. Defense Personnel Support Center, Philadelphia, Pa.

—**Hoosier Tarpaulin & Canvas Goods Co.**, Indianapolis, Ind. $1,102,409. 10,984 tent sections with covers. Defense Personnel Support Center, Philadelphia, Pa.

—**RCA**, Washington, D.C. $1,297,366. 45 items of electronic data processing equipment. Defense Electronic Supply Center, Dayton, Ohio.

—**IBM**, Dayton, Ohio. $1,408,833. 12 items of electronic data processing equipment. Defense Electronic Supply Center, Dayton, Ohio.

5—**Montgomery Pipe & Tube Co.**, Miami, Fla. $1,408,450. 170,000 coils of concertina barbed wire. Defense Construction Supply Center, Columbus, Ohio.

10—**Pettibone-Mulliken Corp.**, Washington, D.C. $4,163,714. 240 diesel fork lift trucks. Defense General Supply Center, Richmond, Va.

—**Max Waller Co.**, Baltimore, Md. $1,094,-440. Fuel oil. Defense Fuel Supply Center, Alexandria, Va.

—**Gulf Oil Corp.**, Houston, Tex. $3,605,891. Fuel oil and gasoline. Defense Fuel Suply Center, Alexandria, Va.

—**Humble Oil & Refining Co.**, Houston, Tex. $1,427,517. 315 barrels of combat, Type I, gasoline. Defense Fuel Supply Center, Alexandria, Va.

11—**Otis Elevator Co.**, Cleveland, Ohio. $1,476,850. 220 electric fork lift trucks, Defense General Supply Center, Richmond, Va.

13—**Kaiser Steel**, El Monte, Calif. $2,331,258. 2,686,090 72-inch fence posts. $1,017,157. 2,450,980 32-inch fence posts. Defense Construction Supply Center, Columbus, Ohio.

—**Republic Steel**, Chicago, Ill. $1,914,000. 200,000 spools of barbed wire. Defense Construction Supply Center, Columbus, Ohio.

—**American Tent Co.**, Canton, Miss. $3,579,-550. 19,138 general purpose medium tents with covers. Defense Personnel Support Center, Philadelphia, Pa.

—**Burlington Industries**, New York, N.Y. $2,149,784. 1,820,000 linear yards of wind resistant and water repellent sateen. Defense Personnel Support Center, Philadelphia, Pa.

—**Reigel Textile Corp.**, New York, N.Y. $1,004,322. 775,000 linear yards of wind resistant and water repellant sateen. Defense Personnel Support Center, Philadelphia, Pa.

18—**U.S. Bronze Powders, Inc.**, Flemington, N.J. $1,479,259. 4,700,000 lbs. of atomized aluminum powder. Defense General Supply Center, Richmond, Va.

—**Reynolds Metals Co.**, Richmond, Va. $2,-630,250. 8,350,000 lbs. of atomized aluminum powder. Defense General Supply Center, Richmond, Va.

—**Aluminum Co. of America**, Pittsburgh, Pa. $18,275,019. 56,276,000 lbs. of atomized aluminum powder. Defense General Supply Center, Richmond, Va.

19—**Magline, Inc.**, Pinconning, Mich. $9,593,-567. 24,656 tent frame sections. Defense Personnel Support Center, Philadelphia, Pa.

—**B. G. Colton & Co.**, New York, N.Y. $2,006,250. 1,500,000 linear yards of wind-resistant sateen cotton nylon cloth. Defense Personnel Support Center, Philadelphia, Pa.

23—**Etowah Industries**, Etowah, Tenn. $1,036,-000. 400,000 men's cotton wind-resistant coats. Defense Personnel Support Center, Philadelphia, Pa.

—**Barstow Sportswear**, Cartersville, Ga. $1,536,000. 600,000 men's cotton wind-resistant coats. Defense Personnel Support Center, Philadelphia, Pa.

—**Richard Wynn Enterprises**, Knoxville, Tenn. $1,370,000. 500,000 men's cotton wind-resistant coats. Defense Personnel Support Center, Philadelphia, Pa.

24—**U.S. Metal Container Co.**, Miami, Okla. $1,119,650. 320,000 military gasoline cans. Defense General Supply Center, Richmond, Va.

25—**Prestex, Inc.**, New York, N.Y. $1,525,050. 2,000,000 yards of duck, cotton-warp and rayon filling cloth. Defense Personnel Support Center Philadelphia, Pa.

—**Saddler Textiles, Inc.**, New York, N.Y. $1,212,084. 972,000 linear yards of wind-resistant, sateen cotton cloth. Defense Personnel Support Center, Philadelphia, Pa.

31—The Defense General Supply Center, Richmond, Va., has awarded the following contracts for polypropylene sand bags:

Cavalier Bag Co., Lumberton, N.C. $4,-933,813. 24,500,000 sand bags.

Bemis Co., Minneapolis, Minn. $1,104,-926. 5,500,000 sand bags.

Continental Bag Co., Crowley, La. $1,-671,931. 8,100,00 sand bags.

CONTRACT LEGEND

Contract information is listed in the following sequence: Date—Company — Value — Material or Work to be Performed—Location of Work Performed (if other than company plant) — Contracting agency.

DEPARTMENT OF THE ARMY

2—**Robert L. Guyler**, Lampasas, Tex. $1,478,-169. Construction work on expansion of a hospital at Fort Gordon, Ga. Engineer Dist., Savannah, Ga.

—**James Julian, Inc.**, Wilmington, Del. $1,320,066. Construction work on the Aylesworth Creek, Dam and Reservoir Project, Lackawanna County, Pa. Engineer Dist., Baltimore, Md.

—**Ford Motors**, Dearborn, Mich. $1,250,000. Production engineering services for 5-ton trucks. Tank Automotive Command, Warren, Mich.

—**Firestone Tire & Rubber Co.**, Akron, Ohio. $7,705,525. Track shoes for M60 tanks. Noblesville, Ind. Tank Automotive Command, Warren, Mich.

—**Eltra Corp.**, Toledo, Ohio. $1,120,553. Generators for ¼, ¾ and 2½-ton trucks. Tank Automotive Command, Warren, Mich.

—**United Aircraft**, Stratford, Conn. $3,760,-000. Components and crew armor kits for CH-54A helicopters. $1,320,000. 30 sets of engine air particle separators for CH-54A helicopters. Aviation Material Command, St. Louis, Mo.

—**Bell Helicopter Co.**, Fort Worth, Tex. $1,896,600. UH-1 helicopters. Aviation Material Command, St. Louis, Mo.

—**McDonnell-Douglas Corp.**, Titusville, Fla. $5,500,000. Four months of advanced production engineering effort and engineering services with first and second year Dragon missile system production to be included when contract is definitized. St. Louis, Mo. and Titusville. Army Missile Command, Huntsville, Ala.

3—**General Motors**, Cleveland, Ohio. $3,345,-000. Continuation of production engineering services for M551 vehicles. Army Weapons Command, Rock Island, Ill.

—**Joseph L. Pohl Contractors**, Nevada, Mo. $1,464,400. Construction work on the Chariton River Levees. Near Glasgow, Mo. Engineer Dist., Kansas City, Mo.

4—**Martin-Johnson Inc.**, Pensacola, Fla. $1,-$063,247. Construction of a jet engine test cell at Elgin AFB, Fla. Engineer Dist., Mobile, Ala.

5—**Electro-Mechanics, Inc.**, New Britain, Conn. $1,464,820. Cable assemblies for 750 and 500 lb. bombs. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Peter Kiewit Sons' Co.**, Milmont Park, Milmont Park, Pa. $1,750,600. Repair of locks on the St. Lawrence Seaway. Messena, N.Y. Engineer Dist., Buffalo, N.Y.

6—**Vitro Corp. of America**, Fort Walton Beach, Fla. $1,166,914. Design, development, fabrication, installation and testing of three fixed and two mobile telemetry acquisition systems for the system test facility range at the Army Electronics Proving Ground. Procurement Div., Fort Huachuca, Ariz.

—**Uniroyal, Inc.**, Mishawaka, Ind. $1,168,552. Fuel tanks for UH-1 helicopters. Aviation Material Command, St. Louis, Mo.

—**Hechethorn Mfg. Co.**, Dyersburg, Tenn. $1,106,389. Metal parts for hand grenades. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**General Electric**, Burlington, Vt. $10,-270,182. Maintenance spare parts for the 7.62mm aircraft machine gun and pod. Army Weapons Command, Rock Island, Ill.

—**Lear Siegler, Inc.**, Anaheim, Calif. $1,-500,000. Electronics equipment. Electronics Command, Fort Monmouth, N.J.

—**Philco Corp.**, Philadelphia Pa. $1,749,017. Secure voice access system and ancillary items. Electronics Command, Fort Monmouth, N.J.

—**Page Communications Engineers**, Washington, D.C. $4,707,053. Maintenance and operation services in connection with Integrated Wide Band Communications Systems in Southeast Asia. Electronics Command, Fort Monmouth, N.J.

9—**Rulon Co.**, Chicago, Ill. $2,150,000. Metal parts for fuzes for field artillery weapons. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Robert Simmons Construction Co.**, Louisville, Ky. $2,002,678. Construction of six tank repair shops and four automotive repair shops at Fort Knox, Ky. Engineer Dist., Louisville, Ky.

11—**Westinghouse Electric**, Washington, D.C. $1,060,000. Transportable generator sets. Buffalo, N.Y. Research and Development Laboratories, Fort Belvoir, Va.

—**Flinchbaugh Products**, Red Lion, Pa. $1,000,400. Metal parts for 90mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.

13—**Hercules, Inc.** Wilmington, Del. $53,058,-027. Manufacture of miscellaneous propellants and operations and maintenance activities. Radford, Va. Ammunition Procurement & Supply Agency, Joliet, Ill

—Hughes Tool Co., Culver City, Calif. $2,153,159. Crew and component armor kits for OH-6A helicopters. Aviation Material Command, St. Louis, Mo.

—Philco Ford Corp., Newport Beach, Calif. $1,800,000. Chapparral guided missile components. Anaheim, Calif. Army Missile Command, Huntsville, Ala.

—Hercules, Inc., Wilmington, Del. $1,190,-865. Miscellaneous propellants and mixed acids. Lawrence, Kan. Ammunition Procurement & Supply Agency, Joilet, Ill.

17—Applied Devices Corp., College Point, N.Y. $1,379,085. Hawk simulator trainers. Army Missile Command, Huntsville, Ala.

—Honeywell, Inc., Hopkins, Minn. $2,566,-465. Grenade fuzes. St. Louis Park, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Bell Helicopter, Fort Worth, Tex. $2,597,-018. Rotary rudder blades for UH-1 helicopters. Aviation Material Command, St. Louis, Mo.

—Carey-Waterbury Co. and North American Dye Corp., Danbury, Conn. $1,131,016. Colored smoke dye. Army Arsenal, Edgewood, Md.

—Norris Industries, Everett, Mass. $10,-890,366. 66mm rocket launchers. Brockton, Mass. Ammunition Procurement & Supply Agency, Joliet, Ill.

—International Harvester Co., Chicago, Ill. $1,851,016. Cargo trucks. Springfiled, Ill.; Minneapolis, Minn. and Milwaukee, Wis. Tank Automotive Command, Warren, Mich.

18—United Aircraft, Stratford, Conn. $5,-000,000. Long lead time materials and components for CH-54A helicopters. Aviation Material Command, St. Louis, Mo.

—Hollingsworth Co., Phoenixville, Pa. $2,-190,325. Three KW generators (AC). $1,783,468. Three KW generator sets (DC). Aviation Material Command, St. Louis, Mo.

—Federal Cartridge Corp., Anoka, Minn. $3,476,935. 5.56mm ball cartridges in 10-round clips. Frankford Arsenal, Philadelphia, Pa.

—Canadian Commercial Corp., Ottawa, Ontario, Canada. $2,203,600. Ten-round clips of 5.56mm ball cartridges. Courcelette, Quebec, Canada. Frankford Arsenal, Philadelphia, Pa.

19—Canadian Commercial Corp., Ottawa, Ontario, Canada. $1,147,945. 3,563,300 lbs. of nitroguanadine. Niagra Falls, Canada. Ammunition Procurement & Supply Agency, Joliet, Ill.

—DeMauro Construction Corp., Carson City, Nev. $1,621,288. Construction of 23 miles of raw water mains, including necessary valves and replacement of pavement. Ufu and Taiho, Okinawa. Engineer Dist., Okinawa.

—Bell Helicopter Co., Fort Worth, Tex. $1,848,509. Gear box assemblies for UH-1 helicopters. Aviation Material Command, St. Louis, Mo.

—Air Logistics Corp., Pasadena, Calif. $1,239,064. 392 sets of assault trackway and applicable parts kits for helicopter landings. Mobility Equipment Command, St. Louis, Mo.

20—Beech Aircraft, Wichita, Kan. $1,320,704. U-21A aircraft and related data. Aviation Material Command, St. Louis, Mo.

—RCA, Moorestown, N.J. $3,995,000. System study to determine and identify the detailed system and subsystem design of the Mallard Communication System. Electronics Command, Fort Monmouth, N.J.

—Sylvania Electric Products, Waltham, Mass. $3,500,000. System study to determine and identify the detailed system and sub-system design of the Mallard Communications System. Electronics Command, Fort Monmouth, N.J.

23—Mason & Hanger—Silas Mason Co., New York, N.Y. $26,011,283. Loading, assembling and packing artillery projectiles, mines and related components. Burlington, Iowa. $2,792,125. Loading, assembling and packing large caliber ammunition, mines and bombs. Grand Island, Neb. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Hayes International Corp., Birmingham, Ala. $2,460,800. Metal parts for 2.75-inch rocket warheads. Ammunition Procurement & Supply Agency, Joliet, Ill.

—KDI Corp., Cincinnati, Ohio. $2,336,480. Metal parts for 2.75-inch rocket fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Hayes Albion Corp., Albion, Mich. $2,-041,600. Metal parts for 2.75-inch rocket warheads. Hillsdale and Albion, Mich. Ammunition Procurement & Supply Agency, Joliet, Ill.

—General Time Corp., LaSalle, Ill. $2,020,-200. Metal parts for 2.75-inch rocket fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Weatherhead Co., Cleveland, Ohio. $1,869-562. Metal parts for 105mm HEAT projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Airport Machining Corp., Martin, Tenn. $1,420,800. Metal parts for 2.75-inch rocket warheads. Union City, Tenn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Southwest Truck Body Co., St. Louis. Mo. $5,742,514. Semi-trailer mounted general purpose repair shop equipment. West Plains, Mo. Mobility Equipment Command, St. Louis, Mo.

—Sylvania Electric Products, Inc., Mountain View, Calif. $4,172,756. Classified research and development. Santa Cruz and Mountain View, Calif. Research and Development Laboratories, Fort Belvoir, Va.

—Teledyne Industries, Garland, Tex. $1,-587,000. Low frequency amplifiers. Research and Development Laboratories, Fort Belvoir, Va.

—Motorola, Inc., Scottsdale, Ariz. $1,555,372. Surveillance sets. Electronics Command, Fort Monmouth, N.J.

24—Crest Construction Corp., Norfolk, Va. $3,582,654. Construction of an academic building at the the Army Logistics Management Center, Fort Lee, Va. Engineer Dist., Norfolk, Va.

—Kaiser Steel, El Monte Calif. $2,522,000. M2A1 ammunition boxes. Burbank, Calif. Frankford Arsenal, Philadelphia, Pa.

—ESB, Inc., Raleigh, N.C. $1,953,153. Primary wet batteries for the Nike Hercules missile. Electronics Command, Philadelphia, Pa.

—Standard Container Co., Montclair, N.J. $1,865,500. M2A1 ammunition boxes. Homerville, Ga. Frankford Arsenal, Philadelphia, Pa.

—Bulova Watch Co., Jackson Heights, N.Y. $1,609,650. Metal parts for 2.75-inch rocket fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Sperry Rand, St. Paul Minn. $1,500,000. Classified electronics equipment. Electronics Command, Fort Monmouth, N.J.

25—Galion Amco, Inc., Galion, Ohio. $3,517,-200. 20mm cartridge fuzes. Frankford Arsenal, Philadelphia, Pa.

—Supreme Products, Chicago, Ill. $2,747,900. 20mm cartridge fuzes. Frankford Arsenal, Philadelphia, Pa.

—Waltham Precision Instruments, Waltham, Mass. $1,583,818. 20mm cartridge fuzes. Frankford Arsenal, Philadelphia, Pa.

—Zeller Corp., Defiance, Ohio. $1,047,900. 20mm cartridge fuzes. Frankford Arsenal, Philadelphia, Pa.

—Dorsey Trailers, Elba, Ala. $3,038,665. Semi-trailers. Tank Automotive Command, Warren, Mich.

—Theurer, Inc., Newark, N.J. $2,704,122. M750 semi-trailers. Tank Automotive Command, Warren, Mich.

—United Ammunition Container Corp., Philadelphia, Pa. $2,223,840. M105A2 ammunition containers. Atlanta, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Olin Mathieson Chemical Corp., East Alton, Ill. $2,107,970. MK 52 auxiliary detonating fuzes for major caliber projectiles. Marion and East Alton, Ill. Harry Diamond Laboratories, Washington, D.C.

—Peter Kiewit Sons, Inc., Milmont Park, Pa. $1,655,971. Culvert crack repair of lock at Massena, N.Y. Engineer Dist., Buffalo, N.Y.

—Cabot Corp., Pampa, Tex. $1,251,192. Tube forgings for the 152mm M81 gun and the 152mm XM162 gun. Kings Mill, Tex. Army Arsenal, Watervliet, N.Y.

27—American Machine & Foundry Co., Brooklyn, N.Y. $12,728,624. Metal parts for 750-lb. bombs. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Levinson Steel Co., Pittsburgh, Pa. $6,-604,500. Metal parts for 105mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Donovan Construction Co., New Brighton, Minn. $6,400,000. Metals parts for 155mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.

—General Motors, Detroit, Mich. $3,280,488. Diesel engines for armored personnel carriers. Tank Automotive Command, Warren, Mich.

—Canadian Commercial Corp., Ottawa, Ontario, Canada. $2,550,000. Tracked vehicles. Montreal, Quebec Canada. Tank Automotive Command, Warren, Mich.

—Firestone Tire & Rubber Co., Akron, Ohio. $1,712,776. Pneumatic tires for earth movers. Des Moines, Iowa and Bloomington, Ill. Tank Automotive Command, Warren, Mich.

—Remington Arms Co., Bridgeport, Conn. $5,122,089. Ten-round clips of 5.56mm ball cartridges. Frankford Arsenal, Philadelphia, Pa.

—Philco-Ford Corp., Newport Beach, Calif. $1,451,200. Guided missile system test sets. Army Missile Command, Huntsville, Ala.

—RCA, Camden, N.J. $1,826,206. Panoramic telescopes for 175mm and 8-inch howitzers. Frankford Arsenal, Philadelphia, Pa.

—Maremount Corp., Saco, Maine. $1,648,626. M60 machine guns, spare barrels and bipod assemblies. Rock Island Arsenal, Ill.

—Western Electric, New York, N.Y. $1,-295,800. Dual display console kits for modification of the Nike Hercules missile system. Burlington, N.C. Army Missile Command, Huntsville, Ala.

30—Cessna Aircraft, Wichita, Kan. $5,453,214. Bomb dispensers. Procurement Detachment, Chicago, Ill.

—General Electric, Burlington, Vt. $2,540,-000. 20mm air defense artillery guns. Procurement Detachment, New York, N.Y.

—Southwest Truck Body Co., St. Louis, Mo. $1,682,840. Semi-trailer mounted shop sets. West Plains, Mo. Mobility Equipment Command, St. Louis, Mo.

—Bermite Powder Co., Saugus, Calif. $1,-468,200. Auxiliary detonating fuzes for major caliber projectiles. Harry Diamond, Laboratories, Washington, D.C.

31—Olin Mathieson Chemical Corp., New Haven, Conn. $18,606,540. Ammunition. $1,126,510. Amunition. Frankford Arsenal, Philadelphia, Pa.

—Olin Mathieson Chemical Corp., East Alton, Ill. $14,816,053. Ammunition. $3,-980,038. Ammunition. Frankford Arsenal, Philadelphia, Pa.

—Remington Arms, Bridgeport, Conn. $13,-613,250. Ammunition and ammunition cartons. $1,598,628. Ammunition. Frankford Arsenal, Philadelphia, Pa.

—Canadian Commercial Corp., Ottawa, Ontario, Canada. $7,158,800. Ammunition. Courcelette, Quebec, Canada. Frankford Arsenal, Philadelphia, Pa.

—Amron Corp., Waukesha, Wis. $5,976,000. Metal part for 20mm projectiles. Frankford Arsenal, Philadelphia, Pa.

—Zeller Corp., Defiance, Ohio. $3,985,930. Metal parts for 20mm projectiles. Frankford Arsenal, Philadelphia, Pa.

—National Presto Industries, Eau Claire, Wis. $7,000,000. Eight-inch projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Kennedy Van Saun Corp., Danville, Pa. $3,007,620. Metal parts for 4.2-inch projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Parson Mfg. & Stamping Co., Cordova, Tenn. $2,381,491. 4.2-inch projectile parts. Ammunition Procurement & Supply Agency, Joliet, Ill.

—AVCO Corp., Richmond, Ind. $1,487,427. Metal parts for 40mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Penland Paper Converting Corp., Hanover Pa. $1,254,600. 105mm ammunition containers. Ammunition Procurement & Supply Agency, Joliet, Ill.

—M. C. Riccardi Co., Alpha, N.J. $1,249,-500. Fiber ammunition containers. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Canadian Commercial Corp., Ottawa, Ontario, Canada. $8,541,400. Vehicular mounted radio relay sets. Electronics Command, Fort Monmouth, N.J.

—International Telephone & Telegraph Corp., Easton, Pa. $4,000,000. Assembly of 25mm image intensifiers. Roanoke, Va. Electronics Command, Fort Monmouth, N.J.

—Varo, Inc., Garland, Tex. $4,000,000. Assembly of 25mm image intensifiers. Electronics Command, Fort Monmouth, N.J.

—Raython Co., Norwood, Mass. $3,811,150. Multiplexers. Electronics Command, Fort Monmouth, N.J.

—Sylvania Electronic Products, Mountain View, Calif. $1,615,000. Research & development for 12 months in the field of Electronics. Electronics Command, Fort Monmouth, N.J.

—**Consolidated Box, Inc.**, Tampa Fla. $2,-313,600. Fiber ammunition containers. Procurement Detachment, New York, N.Y.

—**Eastern Tool & Mfg. Co.**, Belleville, N.J. $1,824,320. Metal parts for 40mm projectiles. Procurement Detachment, New York, N.Y.

—**Eisen Bros., Inc.**, Hoboken, N.J. $1,740,182. Metal parts for 40mm projectiles. Procurement Detachment, New York, N.Y.

—**R. C. Can Co.**, Hazelwood, Mo. $1,377,600. Fiber ammunition containers. Procurement Detachment, New York, N.Y.

—**Electro Mechanical Corp.**, Sayre, Pa. $2,115,099. Electrical equipment shelters. Electronics Command, Philadelphia, Pa.

—**LTV Electrosystems, Inc.** Huntington, Ind. $1,414,810. Radio receivers and transmitters. Electronics Command, Philadelphia Pa.

—**Mack Trucks**, Allentown, Pa. $6,500,000. Ten-ton tractor trucks. Tank Automotive Command, Warren, Mich.

—**Kaiser Jeep Corp.**, Toledo, Ohio. $1,483,218. ¼-ton utility trucks. Tank Automotive Command, Warren, Mich.

—**Martin Marietta**, Orlando, Fla. $10,351,-000. Continued industrial engineering services in support of the Pershing missile system. Army Missile Command, Huntsville, Ala.

—**Rohm and Haas Co.**, Philadelphia, Pa. $2,-150,000. Propellant research program. Huntsville, Ala. Army Missile Command, Huntsville, Ala.

—**Stanford Research Institute**, Menlo Park, Calif. $1,941,953. Classified research. Army Research Office, Durham, N.C.

—**Brown Engineering Co.**, Huntsville, Ala. $1,137,027. An interim data system program. Nike-X Project Office, Army Missile Command, Huntsville, Ala.

DEPARTMENT OF THE NAVY

2—**United Aircraft**, Stratford, Conn. $5,300,-000. HH-53C helicopters for the Air Force. Naval Air Systems Command.

3—**Westinghouse Electric**, Pittsburgh, Pa. $32,046,453. Design and furnish nuclear propulsion components. Naval Ship Systems Command.

—**Lockheed Aircraft**, Burbank, Calif. $28,-230,000. P3C aircraft. Naval Air Systems Command.

—**Johns Hopkins University**, Silver Spring, Md. $5,783,000. Research and development for the Talos missile. Naval Ordnance Systems Command.

—**General Dynamics**, Pomona, Calif. $1,-300,000. Airborne avionics equipment for the Standard Arm Missile. Naval Air Systems Command.

—**Curtis Wright Corp.**, Wood-Ridge, N.J. $3,875,551. Repair parts in support of various aircraft engines. Aviation Supply Office, Philadelphia, Pa.

—**Westinghouse Electric**, Baltimore, Md. $3,000,000. Production of repair parts and support material for technical evaluation of MK 48 torpedoes, MK 47 mobile targets and associated equipment. Naval Ordnance Systems Command.

—**Texas Instruments**, Dallas, Tex. $1,520,657. Design, development and fabrication of a sonar data acquisition system for submarines. Navy Purchasing Office, Los Angeles, Calif.

—**Pieretti Construction Co.**, Essex, Conn. $1,136,000. Construction of enlisted men's barracks at the Naval Submarine Base, New London, Conn. Naval Facilities Engineering Command.

—**AVCO Corp.**, Richmond, Va. $2,031,606. Design, development, fabrication and test of arming and fuzing systems. Naval Ordnance Laboratory, Silver Spring, Md.

4—**International Telephone & Telegraph**, Paramus, N.J. $2,933,848. Programming services for the Fleet Computer Programing Center, Atlantic, tactical data system. Virginia Beach, Va. Navy Purchasing Office, Washington, D.C.

—**Sperry Rand**, Great Neck, N.Y. $1,314,779. Prototype models of the Phase II Integrated Light Attack Aviation System. Naval Air Systems Command.

5—**United Aircraft**, East Hartford, Conn. $5,968,538. A-4E and A-6A aircraft engine spare parts. Aviation Supply Office, Philadelphia, Pa.

—**Maxson Electronics Corp.**, Macon, Ga. $2,893,500. MK 54 auxiliary detonating fuzes for five-inch 38 cal. projectiles. Navy Ships Parts Control Center, Mechanicsburg, Pa.

6—**General Dynamics**, Pomona, Calif. $24,-797,640. FY 1968 funding for production of medium range Standard missile and extended range Standard missile. Naval Ordance Systems Command.

—**North American Aviation**, Columbus, Ohio. $10,000,000. Support of planned procurement of RA-5C weapon system. Naval Air Systems Command.

—**Bendix Corp.**, Mishawaka, Ind. $4,525,000. Modification of Type II and Type III Talos missile arm configuration. Naval Ordnance Systems Command.

—**Sperry Rand Corp.**, Great Neck, N.Y. $3,587,313. Incremental funding for FY 1968 production of radar sets for Terrier missiles. Naval Ordnance Systems Command.

—**Raytheon Co.**, Lexington, Mass. $2,572,000. Design, development, fabrication, assembly and testing of service model dual radar sets. Naval Ordnance Systems Command.

9—**Lockheed Missiles & Space Co.**, Sunnyvale, Calif. $25,000,000. Production of Poseidon (C-3) missiles and related equipment. Special Projects Office.

—**Metals Engineering Corp.**, Greenville, Tenn. $6,717,957. Conical fin assemblies used with the MK 82, 500-lb. bomb. Navy Ships Parts Control Center, Mechanicsburg, Pa.

11—**General Dynamics**, Pomona, Calif. $2,-498,784. Research and development on the Standard Arm Missile. Naval Air Systems Command.

—**Royal Industries**, Santa Ana, Calif. $3,-523,899. 600-gallon external auxiliary fuel tanks. Naval Air Systems Command.

—**Collins Radio Co.**, Cedar Rapids, Iowa. $3,248,196. Radio sets. Marine Corps Headquarters.

13—**North American Rockwell Corp.**, Columbus, Ohio. $5,000,000. OV-10A aircraft. Naval Air Systems Command.

—**Bendix Corp.**, Baltimore, Md. $3,374,785. Airborne receiver transmitter sets and equipment. Naval Air Systems Command.

—**Collins Radio Co.**, Richardson, Tex. $2,-924,959. Airborne communications sets and equipment. Naval Air Systems Command.

16—**LTV Aerospace Corp.**, Dallas, Tex. $30,-567,850. Modification to three previously issued contracts ($24,247,800 for services and materials to extend the service life of F-8D and F-8E aircraft; $2,320,050 for long lead time effort and materials to support proposed procurement of improvement changes to extend the service life of RF-8A aircraft, and $4,000,000 to increase the limitation of authorization for long lead time effort for A-7D aircraft for the Air Force.) Naval Air Systems Command.

17—**Oshkosh Truck Corp.**, Oshkosh, Wis. $6,-066,130. 190 MB-5 aircraft rescue fire fighting trucks. Midwest Div., Naval Facilities Engineering Command, Great Lakes, Ill.

—**Kaman Corp.**, Colorado Springs, Colo. $1,096,000. Classified services. Special Projects Office.

18—**Horne Bros., Inc.**, Newport News, Va. $1,074,980. Regular overhaul of the attack cargo ship USS Yancey (AKA 93). Supervisor of Shipbuilding, Fifth Naval Dist., Newport News, Va.

19—**United Aircraft**, Hartford, Conn. $2,454,-178. Spare parts to support TF30-P-8 engines on A-7B aircraft. Aviation Supply Office, Philadelphia, Pa.

—**Westinghouse Electric**, Baltimore, Md. $2,043,711. Support items for radar sets. Naval Air Systems Command.

20—**Treadwell Corp.**, New York, N.Y. $1,100,-260. Repair of Government-furnished oxygen generators. Bronx, N.Y. Naval Ship Systems Command.

—**General Electric**, Washington, D.C. $1,-040,937. Research and development effort for Polaris missiles. Pittsfield, Mass. Special Projects Office.

23—**American Bosch Arma Corp.**, Philadelphia, Pa. $1,851,010. Weapons control switching systems for MK 114 fire control systems and related equipment. Naval Ordnance Systems Command.

24—**Lockheed Missiles & Space Co.**, Sunnyvale, Calif. $6,000,000. Construction of the Navy's second Deep Submergence Rescue Vehicle. Naval Ship Systems Command.

—**United Aircraft**, Stratford, Conn. $2,578,-272. Main rotor blades for H-34 aircraft. Aviation Supply Office, Philadelphia, Pa.

—**Innovations, Inc.**, Lexington, Ohio. $2,252,-110. Missile shipping and storage containers Naval Air Systems Command.

—**Collins Radio Co.**, Cedar Rapids, Iowa. $1,007,093. Airborne electronic communication navigation equipment. Naval Air Systems Command.

25—**United Aircraft**, East Hartford, Conn. $1,650,000. Spare parts for TF-30-P3, P12 engines. $1,125,000. Spare parts for TF30-P12 engines. Aviation Supply Office, Philadelphia, Pa.

—**Ocean Electric Corp.**, Norfolk, Va. $1,-111,000. Installation of an electrical system at the Sewells Point Area Naval Station, Norfolk, Va. Atlantic Div., Naval Facilities Engineering Command, Norfolk, Va.

—**Hawaian Dredging & Construction Co.**, Honolulu, Hawaii. $1,040,000. Dredging coral and stockpiling it at Fort Kamehameha. Naval Supply Center, Pearl Harbor, Hawaii.

26—**General Electric**, Washington, D.C. $5,-700,000. Fire control systems and guidance support enquipment for the Poseidon missile. Pittsfield, Mass. Special Projects Office.

27—**Hughes Aircraft**, Culver City, Calif. $9,-000,000. Incremental funding for the Phoenix missile system. Naval Air Systems Command.

30—**Stanwick Corp.**, Washington, D.C. $2,148,-558. Development and analysis of management information products in support of the Navy Maintenance and Material Management System. $1,181,830. Planning evaluations, engineering design and recommendations in support of overhaul of the attack aircraft carrier USS Franklin D. Roosevelt (CVA-42). Naval Ship Systems Command.

31—**National Steel & Shipbuilding Co.**, San Diego, Calif. $1,013,615. Topside alterations and repairs, and drydocking of the landing ship dock USS Carter Hall (LSD-3). Supervisor of Shipbuilding, Eleventh Naval Dist., San Diego, Calif.

DEPARTMENT OF THE AIR FORCE

2—**Brooks & Perkins**, Detroit, Mich. $1,571,-544. Manufacture of cargo handling equipment. Warner Robins Air Material Area, (AFLC), Robins AFB, Ga.

—**Goodyear Aerospace Corp.**, Litchfield Park, Ariz. $2,568,666. Manufacture of airborne radar components. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Hallicrafters**, Chicago, Ill. $1,934,350. Manufacture of counter-measure equipment. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

3—**Goodyear Aerospace Corp.**, Lichfield Park, Ariz. $1,396,450. Development of an optical radar data correlator system. Systems Engineering Group, Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Fairchild Hiller Corp.**, St. Augustine, Fla. $1,417,934. Maintenance and reconditioning of C-119 aircraft. Warner Robins Air Material Area (AFLC), Robins AFB, Ga.

—**Litton Systems**, Woodland Hills, Calif. $8,411,485. Production of an avionics subsystem for F-4 aircraft. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Raytheon Co., Burlington, Mass. $1,800,-000. Retrofit of radar systems. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass.

4—Texas Instruments, Dallas, Tex. $1,892,-400. Components for an infrared detecting set for F-4C aircraft. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Bendix Corp., Teterboro, N.J. $1,180,838. Production of flight instruments for F-111 aircraft. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Whittaker Corp., Chatsworth, Calif. $2,-400,000. Manufacture of airborne electronics equipment. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Hughes Aircraft, Culver City, Calif. $1,-114,683. Supplies and services for repair and modification of components and assemblies of an airborne fire control system. Los Angeles, Calif. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—Philco Ford Corp., Philadelphia, Pa. $3,-207,088. Production of electronic components for Sidewinder missiles. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

5—Fairchild Camera & Instrument Corp., Syosset, N.Y. $1,499,954. Stabilized camera mounts. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Hallicrafters, Chicago, Ill. $1,072,572. Electronic tubes. Warner-Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

1—Raytheon Co., Waltham, Mass. $3,488,508. Modification of bomb-navigational systems on B-58 aircraft. Warner-Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—Sperry Rand Corp., Great Neck, N.Y. $2,-063,398. Modification of the bomb-navigational system on B-52 aircraft. Warner-Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—General Dynamics, San Diego, Calif. $3,-102,677. Design, manufacture, integration and launch of space vehicles. Space and Missile Systems Organization, (AFSC), Norton AFB, Calif.

2—Litton Systems, Woodland Hills, Calif. $10,935,840. Production of avionics subsystem components for F-4 aircraft. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—United Aircraft, Windsor Locks, Conn. $1,119,994. Overhaul and modification of Hamilton Standard propeller assemblies. East Granby, Conn. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

6—Lockheed Missiles & Space Co., Sunnyvale, Calif. $4,000,000. Agena launch services at Vandenberg AFB, Calif., for period Oct. 1, 1967 through Sept. 30, 1968. Space and Missile Systems Orangization, (AFSC), Los Angeles, Calif.

—Boeing Co., Seattle, Wash. $4,551,735. Continuation of development study and testing programs for the Minuteman missile system. Space and Missile Systems Organization, (AFSC), Los Angeles, Calif.

7—United Aircraft, East Hartford, Conn. $1,224,961. Production of spare parts for J-75 aircraft engines. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

—North American Aviation, Anaheim, Calif. $5,433,200. Guidance and control systems for Minuteman II missile systems. Space & Missile Systems Organization, (AFSC), Norton AFB, Calif.

8—Hoffman Electronics Corp., El Monte, Calif. $4,063,940. Production of air navigation equipment. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

9—Bendix Corp., North Hollywood, Calif. $5,187,782. Production of electronic equipment for F-4E aircraft. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Cleveland Pneumatic Tool Co., Cleveland, Ohio. $1,150,600. Production of landing gear components for KC-130 aircraft. Ogden Air Material Area, (AFLC), Hill AFB, Utah.

0—Magnavox Co., Fort Wayne, Ind. $1,835,-932. Production of aircraft communications equipment. Warner Robins Air Material Area, (AFLC), Robns AFB, Ga.

—General Dynamics, Fort Worth, Tex. $1,-246,340. Machine tool modernization program. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Itek Corp., Palo Alto, Calif. $2,578,160. Airborne radar equipment. Warner Robins Air Material Area, (AFLC), Robins AFB, Ga.

—Tele-Signal Corp., Woodbury, N.Y. $1,151,-300. Engineering and installation of Communication switching centers. Oklahoma City Air Material Area, (AFLC), Tinker AFB, Okla.

23—North American Aviation, Annheim, Calif. $2,718,000. Maintenance, repair, overhaul and modification of Minuteman guidance control systems. Space & Missile Systems Organization, (AFSC), Norton AFB, Calif.

24—Baldwin-Lima-Hamilton Electronics Corp., Waltham, Mass. $1,013,492. Production of a mobile electronic weighing system. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

26—Fairchild Hiller, Hagerstown, Md. $1,426,-778. Various modifications to C-123 aircraft. Warner Robins Air Material Area, (AFLC), Robins AFB, Ga.

27—North American Aviation, Canoga Park, Calif. $1,650,000. Work on an advanced maneuvering propulsion system. Air Force Flight Test Center, Edwards AFB, Calif.

—Goodyear Tire & Rubber Co., Akron, Ohio. $1,317,906. Manufacture of wheels and brakes for F-4 aircraft. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB Ohio.

—Canadian Commercial Corp., Ottawa, Ontario, Canada. $3,832,660. Weapons release system applicable to F-4 Aircraft. Rexdale, Ontario, Canada. Aeronautical Systems Div. (AFSC), Wright-Patterson AFB, Ohio.

30—Lockheed Aircraft, Lake Charles, La. $1,-363,333. Inspection and repair of F-101 aircraft. Ogden Air Material Area, (AFLC), Hill AFB, Utah.

31—Honeywell, Inc., Hopkins, Minn. $16,500,-000. Manufacture of land mines and associated equipment. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Litton Systems, Woodland Hills, Calif. $5,740,850. Production of avionics subsystem components for F-4 aircraft. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—General Electric, West Lynn, Mass. $2,-928,000. Procurement of T-64 aircraft engines. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

OFF-SHORE PROCUREMENT

3—Federal Republic of Germany, Bundesamt fuer Wehrtechnik und Beschaffung, Koblenz, Germany. $1,741,191. Spare parts for the 20mm gun. $9,621,703. 20mm automatic guns. $16,431,945. 20mm ammunition. Work on all three contracts will be performed in Dusseldorf. Army Procurement Center, Frankfurt, Germany.

—Leonhard Leidel K. G., Mannheim, Germany. $1,029,160. Coal. Army Procurement Center, Frankfurt, Germany.

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